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**THROAT COMPLICATIONS IN TYPHOID.**

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INTRODUCTION.

My only plea for bringing the subject matter before this exclusive body of special practitioners is to emphasize the importance of symptoms during the convalescence of typhoid that might be considered by many as ordinary, and to place before the profession the serious conditions of the larynx and trachea that in a short time may result in sudden and unlooked for death. The literature up to within a few years has not properly called attention to the importance of a slight hoarseness that may sooner or later develop a degree of laryngeal stenosis so alarming as to require surgical interference. Our patients, in many instances, have absolutely slipped into the grave when they seemed sailing in the bright water of convalescence, and their untimely end has given us cause for much explanation to the family to whom but a few days before we gave a hopeful prognosis. It is a well known fact that destruction of tissue in almost every part of the human anatomy has been noted during the progress of typhoid fever, from a pin-hole perforation in the intestine to a complete gangrene of the extremities—but few parts escape the infective bacillus, as can be seen by its ravages in the brain, the ear, the thorax, but particularly dangerous is its destructive excursion in the larynx and trachea. Various parts of the alimentary tract may be attacked

in this disease, from the cheeks, where the dreadful noma, as reported by Freymuth and Petruschky, works its havoc, down to the termination of the large intestine.

#### PHARYNGITIS.

The pharynx is sometimes affected. Frequently at the onset there may be actual sore throat, together with a diffuse erythematous rash very similar to the phenomena seen in scarlatina. The inflammation may be only slightly catarrhal; the patient may complain of dryness or a burning sensation in the throat; the tissues may become deeply congested; or a membranous pharyngitis may develop which is serious and fatal. Osler speaks of this coming on in the third week. Taupin reports a case of this kind which occurred in a patient suffering from typhoid fever complicated with measles. Lennox Brown believes that "probably the pharyngitis sometimes occurring in patients suffering from" typhoid and typhus fevers and smallpox is really of the nature of what is called "hospital sore throat." This form of acute pharyngitis occurs in individuals "whose system has become much reduced by hard work under exceedingly unfavorable sanitary conditions of the inspired atmosphere, as well as, in some instances, of food and water supply," but particularly in that class of patients called mouth-breathers or those addicted to alcohol or tobacco.

According to Osler, diphtheria of the pharynx is not uncommon. Hare, in speaking of the symptoms of onset in the alimentary tract, calls attention to a peculiar form of ulceration of the pharynx which has been recorded by Bouveret, Devigne, Denguet, Wagner and Cahn. They have named it "pharyngo-typoid." In this affection the ulcers are clean-cut and superficial. They are seen on the soft palate more frequently than in other parts of the buccal cavity.

However, in nearly all severe cases of typhoid fever, there is usually an inflammation of the pharynx to a greater or lesser degree, and the reason why it is not more generally known is because the trouble is not carefully enough sought for by the medical attendant. The most ordinary lesion is congestion of the mucous membrane with swelling of the glands, similar to that met with in other parts of the alimentary canal.

#### TONSILITIS.

Anders speaks of "tonsillo-typoid" as being characterized by peculiar patchy elevations appearing upon the tonsils. These patches are whitish, and later develop erosive ulcerations.

It is well-known that enteric fever is sometimes ushered in by inflammation of the tonsils, associated with a severe pharyngitis. This

is not always readily diagnosed—first, on account of the situation of the lesions, which, in many cases, are not easy to examine, for the patient is often wretchedly ill, so that he is even mentally dull.

Then, too, tonsilitis is very commonly associated with the condition of general systematic infection. Hare reports an interesting case in point. The patient, a woman of thirty years, was taken ill with what seemed to be a severe attack of acute tonsilitis, with high fever; when the tonsilar swelling and pain began to subside, however, the fever failed to disappear. Blood examination was instituted and the Widal reaction was present. At the same time other symptoms of typhoid fever developed.

#### LARYNGITIS.

Of all throat complications, however, laryngeal complications are most important, although they are ignored to a great extent by the profession at large. They are more frequent than is generally supposed. Even the text-books, as a rule, offer the most meager information. This may be due partly to the fact that as a rule the symptoms other than those relating to the throat are by far the most threatening; partly, to the usual apathetic, stuporous, and feeble condition of the patient; and again to the disinclination or the inability of the physician to use the laryngoscope. More usual and apparently far more often in France and Germany than in Great Britain and Ireland, laryngeal affections in typhoid fever develop as a secondary complication at a late period in the course of the disease.

(a) One form of typhoid fever which is rare is the onset of the symptoms known as "laryngo-typoid." Severe hoarseness, or even aphonia, develops, and acute laryngitis manifests itself clearly. A case of this kind is reported by Bayer and quoted in Hare's work on typhoid. The patient was a physician, who was suffering from aphonia and difficulty in swallowing. Examination showed the existence of an acute laryngo-pharyngitis. Treatment of this condition was followed by improvement. But within a few days a rigor developed, followed by fever and pain in the throat. The soft palate and pharynx were found to be dotted with a number of small superficial abscesses; rose spots subsequently appearing on the abdomen. A very interesting feature of this case was the isolation of the bacillus of Eberth from bits of tissue taken from the head of the ulcers. The local inflammation was so severe that it extended to the ears and patient became deaf. Gerhardt of Würzburg has also described a case in which typhoid fever began as a laryngitis and was at first localized in the larynx. But these respiratory disturbances are not re-

garded as serious, and are very different from those cases of severe ulcerative laryngitis, which are sometimes seen in the advanced stages of enteric fever.

(b) Laryngitis is not a very common complication of typhoid. Sequelæ of this nature are far less frequent in this country than on the continent. Osler has seen ulcers in only four or five instances, and only twice has he observed perichondritis. In both of these cases large pieces of the thyroid cartilage were expectorated. These patients recovered. The chief characteristic of typhoid laryngitis is the strong tendency to active ulcerations, which develop chiefly on or near the epiglottis. Any part of the laryngeal mucous membrane, however, may be attacked. The whole respiratory tract is in a catarrhal state. Every practitioner is familiar with the common occurrence of bronchitis in typhoid fever. In some instances the mucous membrane in other parts of the body shows this same tendency. Examples of this are noted occasionally in the vagina, the gall and urinary bladders.

Laryngitis in typhoid fever may be of several varieties. (1) Simple mucous. (2) Oedematous. (3) Diphtheritic (not very common). Diphtheritis of the pharynx occurred in a most extensive form in two of Oslet's cases. (4) Perichondritic (very rare), leading to necrosis of the cartilages, with oedema of the glottis. Symptoms of laryngeal stenosis are apt to develop. Perhaps a simpler classification is that of Keen's, which he gives in his Toner lecture. (1) Oedematous laryngitis. (2) Ulcerative laryngitis. (3) Laryngeal perichondritis.

As the data of laryngeal complications of typhoid are so comparatively meager it may not be out of place to first review briefly the symptoms and physical signs of the type of acute laryngitis in general, considering later the phenomena of typhoid laryngitis in particular.

*Symptoms (Subjective).*—(a) Functional. Laryngeal respiration, except in severe cases, is not disturbed in adults. When it becomes labored it generally indicates that the inflammation is developing into oedema. When dyspnoea sets in it is mainly paroxysmal and inspiratory. Nasal respiration is more apt to be interfered with when there is hypertrophy of the septum or turbinate bodies, or in children by adenoid growths of the vault of the pharynx.

*Voice.*—Change in the quality of the voice is almost a constant symptom, and is generally the earliest one in acute laryngitis. It is usually rough and hoarse. There is often a tendency to the production of falsetto notes. Shrill notes indicate increased tension, or laryngeal strain. Aphony is apt to develop quickly. Deglutition is

often affected when the fauces on the posterior laryngeal wall is involved by a tumefaction of the arytenoids or cricoid cartilage. Lennox Brown calls attention to the fact that in certain cases hot food causes distinct uneasiness, as it impinges on the epiglottis or arytenoids. Cough is not a constant symptom. It sometimes occurs as a mere effort to expel the cause of the laryngeal irritation. When the laryngitis is of a severe type the cough has a metallic, strident character at first, suggestive of tracheal involvement, but later its characteristics vary with the case, and it may be low-pitched or high, hoarse or aphonic. As exudation occurs the cough becomes looser and loses its spasmodic character. The cough of laryngitis in adults is not generally painful, but is extremely so in children, which, by the way, increases their nervous phenomena.

*Expectoration*, as a rule, is scanty at first. If it becomes abundant, frothy and muco-purulent, it should call attention to the condition of the bronchi. Blood-stained sputum should be regarded seriously.

*Pain* varies in intensity, although it is not a good index of the degree of inflammation. The patient at first feels an irritation in the larynx—tickling or burning—which is followed later by a sensation of tightness and constriction. This may soon give way to free expectoration and relief may readily follow.

*Physical Signs (Objective).*—Laryngoscopic examination is here called into play. It is well known that the COLOR of the tissues is always augmented in acute laryngitis, the shades changing according to the severity of the attack. The vocal cords vary greatly in the involvement, for they may present a normal appearance even when the inflammation is severe. Again, they may be affected to a greater degree apparently than any other part of the larynx.

*Surface Changes.*—The surface is apt to be roughened and may become eroded. True ulceration is rare. In the larynx of the continued fevers, and of the exanthemata, there are characteristic changes due to the specific diseases, besides the inflammatory alterations seen in each individual case.

*Form Changes.*—In mucous laryngitis it is rare to see the form much altered. The ventricular bands, however, which are the only parts likely to become swollen, may be so changed as to hinder a view of the cords. In simple laryngitis the epiglottis may become slightly swollen so as to lose its sharp and well defined outline. Muscular paralysis will, of course, alter the laryngeal image.

*Secretion* is lacking at first, but later becomes excessive. It finally becomes mucoid or muco-purulent and even may be mixed with blood.

(c) *External Signs*.—As a rule, there is tenderness, and at times pain can be elicited on pressure over the thyroid plates; the glands in this region are not greatly enlarged, though they are sometimes painful. However, external changes in form or color due to the inflammation are not frequently observed. An attempt should always be made to use the laryngoscope; this is a most important point, the results being often surprising and decidedly out of proportion to the slight indications for this manoeuvre.

Position of the ulcers will be considered later.

*History*.—Although the subject of laryngeal and tracheal complications in typhoid has been slighted by the majority of writers, and those who have been interested in the subject have disagreed on many points, still most authors who have given any earnest attention to the subject at all meet on one common plane, and agree concerning the seriousness of laryngeal affections which come on in the later stages of this fever. In the early part of the last century Bouillard and Louis in 1825 and 1829 respectively both refer to laryngeal complications, and even before that Thulier in 1815 and Bayle in 1817 called attention to affections of the larynx, conditions which the latter had noted in a case ten years before. From that time up to 1876 when Keen collected 169 cases from time to time, however, there were scattering reports on the subject. Among these was Turck's communication, in which he reported the history of eight valuable cases.

The classic work of Keen, as embodied in the Toner lecture, stands out as a gem in the literature on this subject, and the writer has not hesitated to draw freely from its rich granaries of thought.

Luning, in 1884, who knew nothing of Keen's publication, reported two hundred and thirteen cases, which were probably Keen's, plus fourteen personal ones. In 1898 Keen added 38, making 221 cases up to 1896. These were practically all that were reported in fifty years prior to 1896.

From this date up to May, 1903, Dupuy reported 35 cases, one of which was his own. The record stands, then, as 256 cases approximately in fifty-eight years. The writer will give a list of his own 6 cases at the end of this paper, together with the few others, the records of which he has hunted up between May, 1901, and the present writing.

*Pathogenesis*.—Concerning this phase of the subject there has been much discussion. Rokitansky upheld the typhogenic nature of the laryngeal ulcer on anatomical reasons, believing that ulceration affected the adenoid tissues of the larynx itself. Kanthack said that this was incorrect, reasoning since along the tip and edges of the

epiglottis and over the processus vocalis, no such tissue ever develops. Watson Williams, on the other hand, thought that these lesions were more often associated with the Eberth-Gaffky bacillus than did Kanthack. Williams reports a case in which one of the tubes inoculated from the vocal processes of a typhoid patient yielded a plate culture of numerous typhoid bacillus colonies, with a very few colonies of some liquifying microorganism. Williams, in his report, goes on to state that he believes a nurse contracted the disease from the coughing and expectoration of her typhoid patient. Osler says that he believes the bacilli have not yet been found in the laryngeal ulcers. As Baer well says, ulceration of the larynx has been for many years a mooted question, the point of dispute being whether the lesion was due to the typhoid bacillus, or to fresh infections with pyogenic organisms. Since Williams, in 1894, found the typhoid bacillus in laryngeal ulcers the tendency has grown to regard these ulcers as primarily typhoidal.

Keen agrees with those who "do not believe that these ulcers are specific in their origin, but belong 'to the common cortege of septic diseases' and other allied disorders, in which the low grade of inflammation readily runs into ulceration and even into local gangrene. How much influence local stasis of the blood or even a septic thrombus in the vessel may have has not been carefully investigated." Keen believes them, however, to be no unimportant factors, and this view is held by the writer.

Duffey thinks it reasonable that the inflammation and ulceration of the laryngeal mucous membrane and the subsequent necrosis of the laryngeal cartilages are of a specific or typhogenous nature—the result of the invasion of the typhoid bacillus.

Hoffmann believes that laryngeal ulceration is due to changes of a secondary nature which are not necessarily connected with typhoid. Eppinger classifies the affections of the larynx in two large groups—one class stands in line with the changes in the intestine as typhoidal. He believes in the possibility of a secondary infection by a diphtheritic process. Landgraf holds that typhoid is not an affection of the intestine, but of the whole lymphatic system, the poison of typhoid at times, however, localizing itself.

*Pathology.*—Probably the simplest division of these affections from a pathological standpoint is that already mentioned: 1. Oedematous laryngitis; 2. ulcerative laryngitis; 3. laryngeal perichondritis. Although this classification may sound clean-cut, practically these forms are very apt to overlap each other, and a careful distinction between them is most difficult or impossible to make. Oedema may be present by itself, or it may develop from either of

the other affections. Ulceration may lead to perichondritis, or perichondritis may be primary and result in oedema or abscess formation. Emmet and Buck have observed cases of simple asthenic oedema. Keen believes that future study will often show that local venous thrombosis has often been at the root of the oedema. Even here, however, we find conflicting opinions among different authorities. Sestier believes that the ulcers are always secondary to perichondritis, while Moritz-Haller believes that perichondritis is secondary to ulceration. Gangrene is seldom noted in the larynx and only in severe cases. Albers has reported a case of gangrene of the whole larynx. Inflammatory oedema of the larynx seldom occurs alone without abscess or inflammation of the cartilages. Suppurative perichondritis is almost always associated with ulcer. Lacoarret described a case of perichondritis of the cricoid and first tracheal ring. In a small number of cases in suppurative perichondritis the changes are limited, but in a large number they go on to necrosis of the cartilages, chiefly the cricoid; then the arytenoid, and lastly the thyroid. Although in perichondritis of the cricoid it has been most often noted, according to Landgraf, that plates of the cartilage split off or are disintegrated, there are cases in which the whole cartilage at times seems to be eliminated. Perichondritis of the arytenoids leads generally to total necrosis of the cartilages. Typhoid abscess seldom develops on the vocal cords. The base of the abscess is covered with a bad smelling, dirty, gray, necrotic material. In general, there is only a slight tendency to healing. Landgraf says that the typhoid ulcer comes generally in the second week, or at the height of the fever, though, in many instances, it may come later. It is seldom that the larynx is involved at the end of the first or second week, showing the only symptoms of typhoid (Schusyer). Abscesses of the mucous membrane are rare according to Landgraf, though he reports two cases which occurred in the beginning of convalescence, and one was seen in an ambulatory case. The number of abscesses generally varies between six and thirty. Gangrene forms a large, deep-lying abscess. Sharkey reports a case in which there were no symptoms whatever during the life of the patient, but gangrenous ulcers seen on the autopsy table.

*Frequency.*—Opinion differs considerably with regard to the frequency of intra-laryngeal ulcerations during typhoid. The post-mortem record of St. Bartholomew's Hospital during the years of 1890-1894 and up to October, 1895, show that of 61 cases 14 suffered from loss of substance in the larynx; in 8 the larynx was not examined.

Vincent, in 113 autopsies, has seen 23 cases of ulceration of the laryngeal mucosa, but only one case of deep ulceration and destruction of the cartilages. Oskow reports that among a total of 6,513 cases of typhoid fever, of which 439 were fatal—seen at St. Petersburg from 1886-7 to 1890-91—that he found ulceration of the larynx in about 30 per cent. In the 2,000 Munich series ulceration was observed 107 times. It developed simultaneously with the ulceration in the ileum. These ulcers, according to Osler, occur in the posterior wall, at the insertion of the cords at the base of the epiglottis, and on the ary-epiglottic folds. Catarrhal and diphtheria ulcers may also be present in the later stages, and reinfection may invade any of the eroded structures.

Oedema, independent of ulceration, is rare. In 20 of the Munich group oedema of the glottis was present. Tracheotomy was performed in 8 of this number. Landgraf says that laryngeal oedema is rare, not more than a dozen cases, according to this writer, having been reported in the literature up to his writing. It most often occurs in full convalescence. The prognosis of this affection is very bad, tracheotomy being the only means of relief.

In Retslag's statistics, out of 20 cases of perichondritis, typhoid was described as the cause in eight. Mackenzie published 45 autopsies of cases of necrosis of the cartilages, the cricoid being affected most often. Troussseau says that this affection, more frequently at a later stage of the disease, is especially likely to occur in protracted cases of adynamic type. Landgraf says that in 44 cases of perichondritis of the cricoid there were 26 instances in which the arytenoid was affected. Luning found only ten cases of perichondritis of the thyroid. Landgraf's estimate on all known statistics places typhoid affections of the larynx at 11 per cent of all fatal complications. Gressinger estimates them at 26 per cent of all his fatal cases; Luning at 3 per cent, from clinical statistics and 17 per cent from post-mortem examinations.

One of the latest contributions to the literature on the distribution of ulcers in typhoid fever is by Baer, appearing within the last few weeks. He recites a series of 89 cases which were obtained from two sources, 44 cases from the Cook County Hospital, June, 1897, to June, 1903, and 45 cases from the Presbyterian Hospital, August, 1895, to July, 1902, Chicago. He also gives a series of statistical analyses. In neither of these series is there noted a case of ulcer of the mouth. Mitchell, however, has reported a case in which he speaks of a "loss of substance on each side of the tongue. Gaston David reported a case of gangrene of the tongue." Osler has re-

corded the history of a patient who developed glossitis ten days after the temperature had become normal. Recovery took place in a few days.

As to ulcers of the larynx and trachea, in 1,020 cases 21.3 per cent had ulcers of the larynx; in 439 cases, 0.2 per cent had ulcers of the trachea, and of 648 cases, 2.5 per cent had ulcers in the pharynx. Out of a series of 85 cases, each involving unusual distribution of the ulcers, the larynx was involved in 17 cases, the pharynx in 16, and trachea in 1. The distribution of ulcers in the series of 89 cases referred to gives three in the larynx, 3.4 per cent; in the trachea, 1.1 per cent; none in the pharynx.

Baer, in his researches, has found 3 cases of ulceration of the trachea (Ouskow, Greffier, and his own series). He has found 32 cases of pharyngeal ulcers.

Freudenberger reports a patient with involvement of the uvula from the disease.

As long ago as 1829 Louis said: "The rarity of ulceration of the larynx is the more remarkable since ulcerations are frequently met with around the tip of the epiglottis, the pharynx and the oesophagus. If laryngeal ulcerations are found on a body dead of an acute disease they will establish with nearly perfect certainty and without going any farther that the affection was typhoid fever."

*Etiology.*—Dupuy gives an excellent résumé of the etiology of laryngeal affections. He says that typhoid is a polymorphous disease, and shows a predilection for lymphatic tissue wherever found, so it seems possible to have a primary localization of the disease in the adenoid deposits of the larynx. Reference has already been made to the discussion of this subject. Study of the laryngeal findings and autopsy observations according to many authorities tend to show that the lesions of the larynx in typhoid are so characteristic that they present a separate type which is considered typhoidal. Many observers, among whom are Lucatello, Klebs and Mackenzie, believe that these lesions are identical with the typhoid lesions of Peyer's Patches, and this opinion he agreed to by the writer. Gerhardt reports a case in which the larynx showed the typical typhoid ulcer at the very outset, the other ordinary symptoms appearing in their usual order. In two of Schuster's cases the disease seemed to show itself first in the larynx. Under the subject of pathogenesis we have already spoken of the presence of the typhoid bacillus in the larynx, but which showed abundant pyococci. Schulz, in 1894, demonstrated the Eberth bacillus in the swollen lymphoid nodules of the larynx, both by means of cultures and sections.

Ranvier, Cornil and Watson Williams have had the same evidence from histological examinations.

Dupuy has noted several cases in which both cultures and histological sections failed to reveal the typhoid bacilli.

Dittrich and Ruehle believe that laryngeal ulcerations in typhoid are allied in origin and nature to bedsores, and are due partly to pressure and partly to disturbance in the circulation and innervation of the parts. The term "decubitus ulcers" has been proposed for them. Duffey says that there is possibly a hereditary disposition, or a previous tendency to laryngeal inflammation. This predisposition of patients who are stricken with typhoid renders them more vulnerable than others to this serious complication. Landgraf believes the necrosis of the mucous membrane is a local gangrene produced not by pressure but by blood stasis. Another authority believes that laryngeal ulceration is due to secondary infiltration of the laryngeal mucous membrane, apart from true typhoid infection from general debility.

The dorsal decubitus certainly seems to be a predisposing factor in the causation of these morbid changes in the larynx. The effect of gravity, it is quite probable, which favors venous stasis and softening of the tissues, especially along the posterior wall of the larynx, may result in lesions of the parts which makes the entrance of infectious organisms an easy matter.

*Symptoms.*—As indicated in the introduction, hoarseness is the first symptom, as a rule, to call attention to serious laryngeal manifestations of this disease. Keen has found only 3 cases in which the distinct statement was made that the voice was not altered. Sometimes and generally it is lower in pitch, probably from involvement of the cricothyroid muscle. In many cases the tone is higher, approximating at times to a falsetto voice. In other instances complete aphonia suddenly develops. Unfortunately these initial symptoms of hoarseness and alteration in breathing—for soon after the hoarseness follows dyspnoea—are apt too often to be attributed to the weakness of the condition of the patient. Only frequent examinations, both externally and with the laryngoscope, will give the necessary information of the conditions within the laryngeal cavity. Sometimes deafness intervenes; this has been supposed by some (in common with the hoarseness) to be due to tubal muscular degeneration. It is believed that it is due here at least to oedema and inflammatory swelling; later on, to the mechanical destruction of the tissues of the middle ear or even the labyrinth.

The dyspnoea is paroxysmal and generally occurs at night. The severity increases with every attack until death supervenes. In some

cases, however, the first attack may be prolonged and prove fatal. Keen states that this seems true in regard to the supraglottic variety of oedema; especially if the cricoid be broken down by a necrotic process, this lateral pressure of blood stasis will often cause dyspnoea. Certain authorities, Emmet among them, have reported cases in which, with no previous dyspnoea at all, sudden suffocation came on as the patient assumed the erect posture, life being saved by immediate laryngotomy. In abscess the subjective symptoms are often very slight. Sometimes pain is present, which radiates to the ear by transmission from the auricular branch of pneumogastric nerve. Dysphagia is met with especially in cricoid and arytenoid necrosis. It was present in the case of the physician above referred to, quoted by Hare and seen in two of the author's cases. Keen notes the presence of dysphagia in 21 cases, and its absence in 5; this would denote post-laryngeal involvement. Unfortunately for the patient, laryngeal invasion is apt to occur in a most insidious manner, a milder grade of inflammation being suddenly followed by a stenosis, which means strangulation and death. There is seldom much hemorrhage from the abscesses, although Reyer reports a case of profuse bleeding from a laryngeal ulcer. It seems strange that expectoration counts for so little, but only in a few cases has it been even alluded to by writers. Naturally if it is either purulent or gangrenous the physician should give this symptom his most serious and active attention. Keen says that, although pain and tenderness are so often masked by the mental condition of the patient, they are generally present, especially in perichondritis of the cricoid or thyroid. He urges that the physician make both direct and lateral pressure on the cricoid, as well as sliding it sidewise, for in this way, with the firm vertebral column behind, pain is often elicited, which might otherwise pass unnoticed. Dyspnoea may often be caused by lateral pressure, as has been noted a few moments ago. This author has found external swelling in but 2 instances; nor does he put any faith in the appearance of the pharynx as a means of warning of coming danger. He reports that of 16 cases it was normal in 10, and inflamed only in 6. In those cases that have been examined with the laryngoscope the most common points "observed were the fixation of at least one cord in the middle line, diminished mobility of the other, swelling of the ary-epiglottidean folds, stenosis of the larynx increased by lateral pressure, a depression of the mucous membrane in case of destruction of the arytenoid, and sometimes the opening of an abscess, usually near the processus vocalis." Keen calls attention to the fact that the swelling of a cricoid abscess on the posterior wall is not visible at all times. As to *sex*, Duffey says

that in the cases that he has looked up, in which the particulars were given, the patients, with one exception, were young men. Keen says that in 94 cases in which the age is recorded he has found but 6 under fifteen years of age; sixty from fifteen to twenty-two, and 28 above twenty-five years. In 110 cases he has found 86 in men and 24 in women; in other words,  $3\frac{1}{2}$  to 1.

As to the *time of development*, none of Oskow's occurred in the first week of illness. In the second week he reports 79 cases, or 15 per cent; in the third week, 144 cases, or 37 per cent; in the fourth week, 89 cases, or 39 per cent showed ulceration. Kanthack and Drysdale report that in their cases the intestinal ulceration had been extensive in 8 cases, limited in 2, and healing or healed in 4. Kanthack continues that it is not true that the laryngeal lesions invariably appear during the acute period of the fever before healing commences, as these instances show. In Keen's report of 102 cases 4 occurred in the first week, 13 in the second, 19 in the third, and 66 from four weeks to two months. As to the *site* of the ulcers, Osler states that they occur in the posterior wall, at the insertion of the cords, at the base of the epiglottis, and on the aryepiglottideal folds. The cartilages are very apt to become enlarged. Luning gives statistics from the study of 165 cases; supraglottic in 50 cases; infraglottic in 36 cases, and in the glottis itself, 18 cases. This writer believes that the process begins in the arytenoid cartilages, and extends to the cricoid cartilages. Dupuy says that the specific typhoid ulcers show a marked predilection for posterior laryngeal surfaces. He says that true typhoid lesions seem to occupy the adenoid areas normally distributed in the larynx. Here especially at the base of the arytenoids, posterior plate of the cricoid, ventricular bands, in the ventricles of the Morgagni, true typhoid lesions identical with the intestinal lesions develop. Various cases have been reported, in which the epiglottis alone was the site of the ulceration. On account of its anatomical relation to the larynx it is most apt to be involved in laryngeal complications in typhoid fever, where marked oedema exists. In Kanthack and Drysdale's report the epiglottis had been affected alone four times in 14 cases, the larynx proper 7 times, both the larynx and the epiglottis once, while in two cases the soft palate or pharynx was ulcerated as well as the epiglottis. Rheiner calls attention to the fact that the posterior wall of the larynx is the most vascular, and that ossification begins here frequently in the twentieth year. It is natural, then, that this should be the seat of the most frequent inflammations as well as thrombosis of the smaller vessels. When, in addition to this, the etiological factors are considered—dorsal position, repeated movement of the

arytenoid cartilages from the over use of the voice in some cases of delirium, it is easy to explain the usual site of many of these ulcerations. In the later periods of the disease catarrhal and diphtheritic ulcers may be present. As to the *complications* of other diseases noted in the throat, diphtheria is a rare one. Luning collected 17 cases. There are at least 12 in the later literature. It generally develops between the second and third week. Frequently there are other changes in the laryngeal abscess—necrosis of the cartilages, affections of the lungs and perichondritis; the latter generally comes later in convalescence. Of 36 cases noted in the literature, 23 occurred in the fourth, fifth and sixth weeks; only one in the third; the others from the seventh to the fifteenth. Like all complications, perichondritis is noted oftener in men than in women, and most commonly in those of middle age. There is on record one case in a boy three and a half years old, and one in a woman sixty-four years old. The course of a case complicated by diphtheria generally tends to rapid death, either through heart weakness or suffocative symptoms. Tuberculosis of the larynx has been noted after the death of a typhoid patient (Horne). Murray and Robertson each report the development of Ludwig's engine during the third week of typhoid fever. In Robertson's case it was proved to be a streptococcus infection.

Cicatrices of the palate, pharynx, epiglottis and larynx seen in patients with a typhoid history must not be confounded with syphilitic scars.

*Diagnosis.*—As has been so well said, in the more severe typhoid affections of the larynx, the diagnosis is suggested by the overshadowing clinical feature of dyspnoea—suffocation, but the apathy of the patient and his insensibility to pain or other threatening symptoms, often mask the true laryngeal condition. The absolute diagnosis can be made only by the examination of the larynx itself. It depends, in part, upon the finding of the specific typhoid bacillus. In catarrhal laryngitis subjective symptoms are generally lacking, though there may be dryness of the throat. Diagnosis is possible only by a careful use of the laryngoscope.

*Course.*—The course of these cases is often most tragic, as has already been indicated; death often occurs most suddenly, unexpectedly and in a frightful guise.

*Prognosis.*—A single swelling can very well heal, but danger lies in the development of complications such as continued hoarseness and dyspnoea.

*Terminations.*—Typhoid affections of the larynx may terminate in the deadly stenosis, which may develop in several ways: It may

follow edema; it may be caused by pressure of the abscess growth, which decreases the lumen of the larynx; it may be a result of the destruction of the cartilages, the walls closing together; in certain cases, even pieces of the cartilage are sucked into the larynx cavity. Keen adds two more interesting causes: "The permanent approximation of one or, more rarely, of both vocal cords from destruction of the fixed points of origin of the muscles; as in two remarkable cases given by Hoffman, shreds of sloughing tissue, on which blood coagulates, may form a sort of polyp, which suffocates the patient even in spite of the tracheotomy."

The location of the stenosis may be in one of three places; supraglottic, subglottic, and least often, the site of the edema is in the glottis itself. In certain cases spontaneous healing occurs, with coughing out of the sequestra, as in the cases of Herard and Schiffer. Landgraf says that in stenosis tracheotomy will accomplish about 60 per cent of cures. Prognosis without operation, however, is absolutely bad. General emphysema of the thorax may follow the perforation of an ulcer. Parsons, in November of 1894, reported a case of acute pharyngitis, in which, on the thirty-second day of typhoid, tracheotomy was performed; subsequent to this general emphysema developed. Wilks first pointed out that emphysema of the neck and trunk may be a consequence of ulcers penetrating the mucous membrane in the back of the larynx. The case which he reports had the ulcer at the junction of the vocal cords. Air had penetrated through the opening into the posterior mediastinum, and thence by the thoracic walls to the neck and the other parts of the body. Von Ziemssen reports the case of a girl of four years, in whom, in the middle of the third week, general emphysema occurred as a result of typhoid; the ulcer was found at the base of the left arytenoid cartilage under the left vocal cord; during life there had been no hoarseness, and no appearance of laryngeal stenosis.

The results of suppurative perichondritis are often a chronic hypertrophy of the perichondrium, which grows to the cartilage. The cartilage may be partly or wholly ossified, with resultant cicatrices. Lori and Halasz report the cicatrization in the neighborhood of the anterior commissure. In many cases permanent damage to the parts by the morbid process necessitates the permanent wearing of a canula. In Luning's 60 cases, which recovered after typhoid perichondritis, 11 were able to lay aside the canula in from seven months to six years, while 49 were obliged to wear it permanently. Necrosis of the cartilages has already been discussed with sufficient emphasis.

*Treatment.*—The general watchword in the treatment of laryngeal or tracheal complications in typhoid is unceasing care and alertness. General treatment and watchfulness are most necessary. In milder forms of inflammation the writer advises steaming inhalations of menthol in tincture benzoin Co, or spraying with mixture of liquid albolene and menthol. Many times the sucking of ice or the ice packed over the neck, and comforting, efficient, but time-wasting. When stenosis, however, has developed, tracheotomy, as a rule, is the only imperative course to pursue. This is especially indicated when the cartilages are recrossed, a condition often following perichondritis. Mortality in this complication, without operation, has been estimated at 95 per cent. Dupuy states that in 10 recoveries 9 were operated upon, while in 16 fatal cases only 4 were operated upon. As to intubation in cases of perichondritis, or necrosis, it is not to be considered with tracheotomy, for it would interfere with the escape of pus and necrotic tissue. Holscher, cited by Pepper, reports tracheotomy as being done 15 times for perichondritis in 2,000 fatal cases of typhoid. Osler, in speaking of the Munich series, says that in 20 cases of edema of the glottis, tracheotomy was performed in 8. Pachnayr, quoted by Stolterforth, says that in 46 cases of tracheotomy for laryngitis in typhoid, 20 recovered. The treatment of post-typhoid cicatricial stenosis by gradual dilatation with bougies and special tubes, according to Dupuy, does not fulfill what it promises. Physicians are too often too timid to institute the right heroic measures. Rash tracheotomy should not be advocated, but the alternative in these cases is, often sure death. If edema or ulceration be found and the danger does not seem great, such palliative measures as the use of the ice, iodine, leeches or even blisters, may be applied externally, and astringents, such as silver nitrate, internally, never forgetting the importance of general treatment and the ready reach of the tracheal tube. If immediate operation is indicated cricothyroid laryngotomy is the best. If there is time enough, tracheotomy is the operation of choice. If the cricoid is involved, laryngo-tracheotomy is advised by Keene, for by this method easier access is given for the escape of pus and loose bits of cartilage, as well as for the treatment of ulcers and granulations. Unless it is absolutely necessary it is best not to operate at the time of a paroxysm. Hemorrhage sometimes offers a grave complication, both at the time of operation and later. In inserting the canula great care should be taken to put it into the larynx and not into an abscess cavity, as has been frequently done (Mohr).

*Without Operative Results.*—Dupuy has given a very interesting report of the effects or rather results of operation and non-operation. He gives the following tables, which he has compiled from 25 cases in which complete reports or abstracts were obtainable. These cases bring Keen's statistics up to May, 1903.

Laryngeal perichondritis .....	5
Laryngeal ulceration .....	5
Laryngeal necrosis .....	3
Laryngeal abductor paralysis .....	2
Laryngeal oedema .....	3
Laryngeal diphtheria (presumably) .....	3
Ludwig's angina .....	2
Abscess in larynx .....	2
	—
	25

#### FINAL RESULTS.

Keen in speaking of the mortality says that in 146 cases of stenosis in which the result has been recorded, 45 recovered and 101 died—a mortality of over 69 per cent. Of 76 cases not operated upon, in which the result is stated and the cases of mere scarification have been included, 17 recovered and 59 died—a mortality of over 77 per cent. Of the 70 cases which underwent some form of bronchotomy, 28 recovered and 42 died—a mortality of 60 per cent. In several of these death might have been avoided if greater care had been observed. These results certainly point out the great necessity for an operation which in the writer's mind can be done in fifteen minutes without the loss of blood and offers to any tyro a safe and expeditious means of averting a dreadful calamity that delay would certainly bring about.

Six cases of laryngeal stenosis occurred in the practice of the writer. Four were males, aged 12, 29, 38 and 41 respectively; two were females, aged 20 and 34.

The author's cases occurred during the convalescent period, were all adults but one, and all terminated fatally. There were no prodromal symptoms except huskiness; that was followed in 6 to 18 hours by slight dyspnoea which became more marked until the stage of cyanosis was reached. Intubation was tried in four cases, but gave little relief from the symptoms. Tracheotomy under cocaine was resorted to later on in four cases, and was done as low as possible; the other two were given chloroform. Operation seemed in three patients to overcome stenosed condition, but later on secondary involvement took place from sepsis. Two of the cases died shortly

after the trachea was opened; in fact, within an hour; the other lived from two to three days. The two cases whose death so quickly followed the opening of the windpipe were in extremis when seen by the writer, hence great rapidity was required in the tracheotomy. Very little blood was, however, lost in any of the operations. In five cases a view of the interior of the larynx was obtained by mirror, revealing but little change from normal condition, except swelling and irregular ecchymosis dotting the mucous membrane.

In half of the cases seen, that is three, there was noted nothing more than an aggravated sub-acute catarrh of the larynx. In the remaining three there was a bilateral incomplete abductor paresis seen by laryngoscopy. In two patients the parts seen above the constriction were somewhat pallid, but puffy, but this was probably due to the long period of illness and the evidence of virulent infection.

One case in point is worthy of mention, and the writer begs to make the following recital:

Dr. G—, about 33 years of age, was in the seventh week of his typhoid, and to all appearances seemed to be on the road to recovery when suddenly he awoke one morning with a slight hoarseness, which was soon followed by a dyspnoea that became more and more marked. Dr. Peabody of the New York Hospital, who was the attendant, called in the writer, and asked him to see the patient at once. Upon my arrival I found the patient cyanosed, with feeble pulse and labored inspiration. A rapid tracheotomy was done, but the patient hardly survived the shock of the operation.

Such, then, is the history in many instances of these throat complications of typhoid fever. In the foregoing case, within a few hours—that is, from the first outbreak of hoarseness to the termination by a dyspnoea—the attendants hardly realized the awful sequence that had such a tragic ending.

These cases were seen during the past three years in consultation, and all in the fifth to seventh week of the disease,

Besides the author's cases, those noted since May, 1903, are referred to in the bibliography, being those of Dupuy, Halbron, Roque and Bancel, Mayer and Ewing Day.

*Paralysis of the Muscles.* From recent investigations it would appear, that paralysis of the laryngeal muscles occurs far more often than is commonly thought. In one hundred consecutive cases Przedlorski found as many as 25 cases of paralysis. The condition is said to have been nearly always due to neuritis, sometimes in association with the affections of other nerves. Hare quotes Gubler as recording paralysis of the soft palate. Nothnagel and Turck have seen paralysis of the vocal cords. Hare says that all of these

symptoms are but evidences of peripheral neuritis. He quotes Bouley and Mendel as believing that the condition of paralysis of the vocal cords following typhoid fever is exceedingly rare. They have found only ten other cases carefully described in the literature, and three others briefly mentioned. In some of these cases the recurrent laryngeal nerve was completely paralyzed with profound paralysis of the abductors. Cases have also been reported by Bernoud. Several years ago McCoy presented a report of three cases of laryngeal paralysis complicating typhoid fever. His classification of these cases is clearly put as follows:

"We can most simply classify these paralysis under the various functions performed by the larynx. Keeping clearly in mind that the chief function of sets of laryngeal muscles is to open and close the glottis, we can simplify the clinical facts by grouping them under the two heads of paralysis of adduction and of abduction. Paralysis of adduction in its various forms is of very great interest, and enters largely into our most interesting laryngological experiences; but it concerns phonation only—a most wonderful function, but not necessary to life. Abduction, on the other hand, concerns the very existence of life—respiration. A moment's faltering in the function of the openers of the larynx, and we cease to exist. Being, then, of so vital importance, we must promptly recognize, during the course of a long and wasting acute disease, like typhoid fever, the imminent risk to life when the abductor muscles are paralyzed," hence the use of the laryngoscope which offers the only solution to the problem of diagnosis in these cases.

Dupuy says that in 20 recorded cases the paralysis was shown chiefly in convalescence, the abductors bearing the brunt of the involvement; he states that the condition was apparently due either to a peripheral neuritis or to pressure on the recurrent nerve by enlarged glands. He speaks of Wishart and McCoy reporting cases, one of which required tracheotomy, and the other intubation.

Landgraf says that paralysis comes on at the height of the illness from deficient innervation of the muscles of the larynx. Of 20 cases which he notes, 13 were male, five were female, and in two the sex was not mentioned. In ten cases there was one-sided vocal paralysis, there were five cases of posticus paralysis; four of adductor, and one of both-sided recurrent paralysis. In four cases paralysis in other nerves was observed; twice there was paraplegia of the legs; in one there was paralysis of the curtain of the palate; once there was weakness and irregularity of the heart action; three cases were complicated with lung lesion, one having disturbance of menstruation.

Five cases of one-sided recurrent paralysis recovered quickly, in from two to four weeks; two remained uncured; in three cases the result was not known.

Of the patients with posticus paralysis, one died of bronchopneumonia. Both recurrents were imbedded in pus, which surrounded the trachea to a considerable depth.

Macroscopically, the nerves and also the (min.) crico-arytenoidei postici were unchanged. Of the other four cases, which were all tracheotomized, only one was able to have the canula withdrawn permanently. Three cases of the adductor paralysis recovered. The patient with double-sided recurrent paralysis died. Section was not made.

The clinical appearances of these cases vary in no way from those arising from other causes. The adductor paralysis should all be considered as *so-called hysterical* cases, and are frequently the expressions of brain disturbance. Of the other cases the pathogenesis is still obscure.

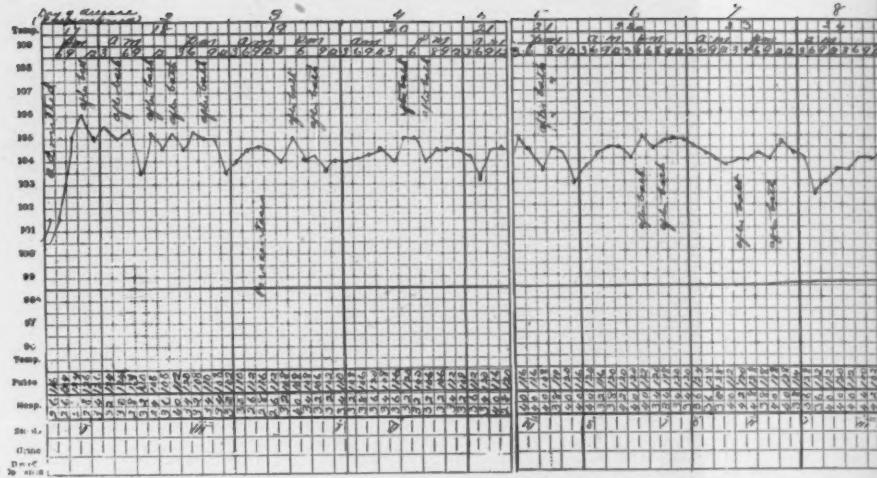
#### CONCLUSIONS.

Tracheotomy offers many advantages over intubation in that the air current can be tapped by the former operation below the obstruction and the danger of forcing fragments of cartilage into the trachea is overcome; again, the tube may rupture an abscess and flood the respiratory tract with pus which (if not causing imminent danger) may provoke a septic pneumonia at a later day.

2. A laryngitis occurring during the course of typhoid fever must always modify our prognosis.
3. Continued hoarseness with slight dyspnoea should at once demand an inspection of the larynx and trachea.
4. A faulty movement of the laryngeal muscles should require internal local medication.
5. Marked dyspnoea should at once call for operative surgical interference.

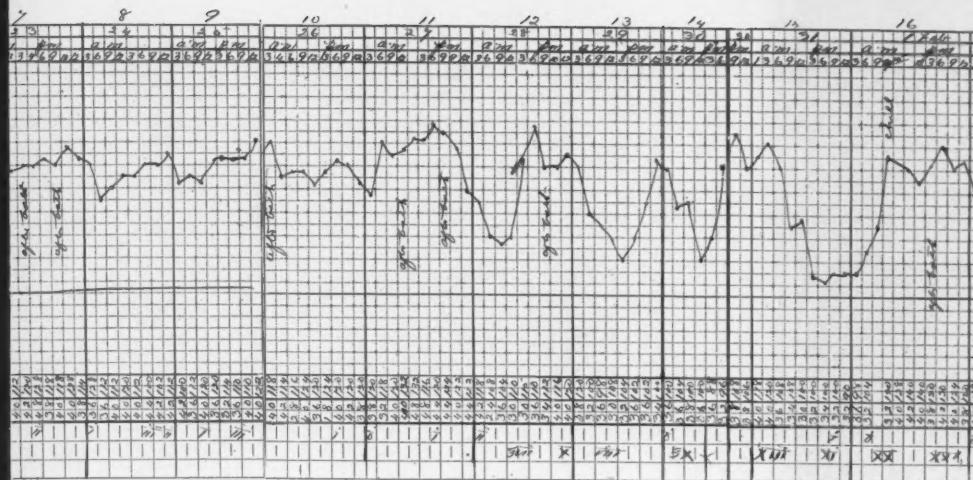
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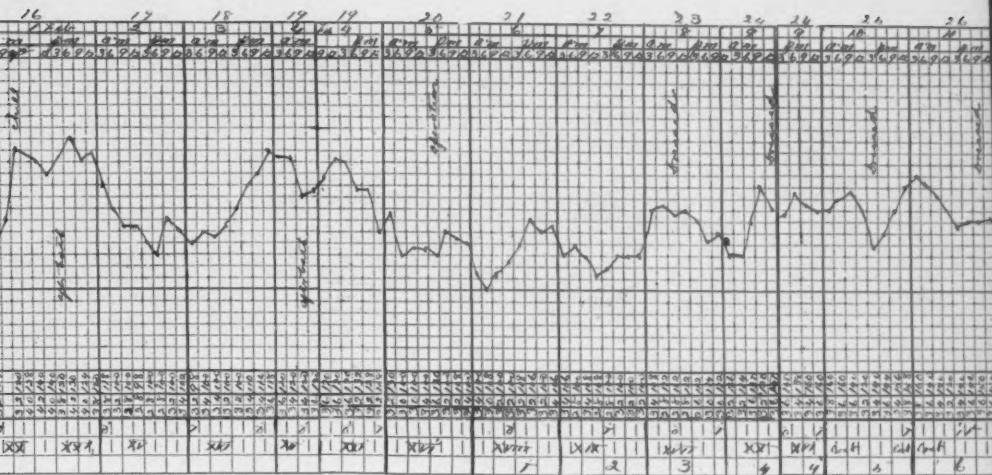
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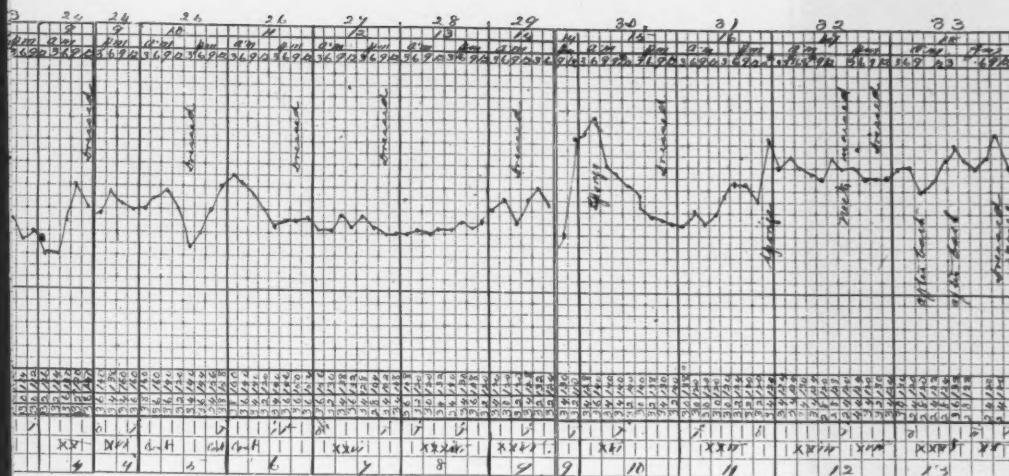


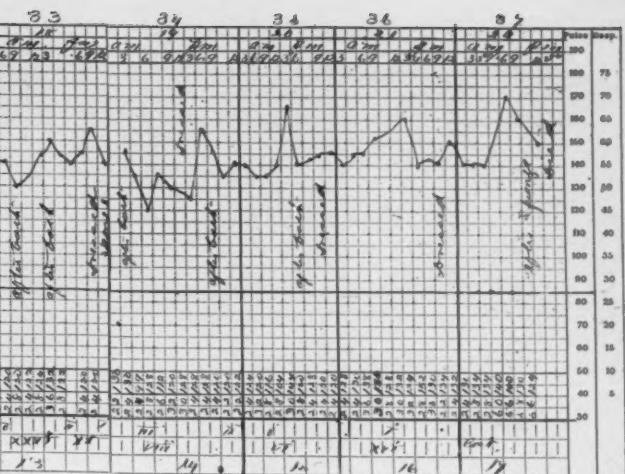
## NEW YORK EYE AND EAR INFIRMARY.

TIMOTHY COAD. DR. DENCH. ADMITTED: JANUARY 17, 1904.



7, 1904.







**REPORT OF A CASE OF ACUTE SUPPURATIVE OTITIS  
MEDIA, COMPLICATED BY DOUBLE PNEUMONIA, SEPTIC  
THROMBOSIS OF JUGULAR BULB; OPERATION. EXCISION  
OF INTERNAL JUGULAR; GENERAL SYSTEMIC INFEC-  
TION; DEATH.\***

BY EDWARD BRADFORD DENCH, M. D.

While cases of sinus thrombosis, with excision of the internal jugular vein, are far from uncommon, and while in the majority of these cases, recovery follows prompt operation, the case about to be narrated presents so many unusual conditions, and while it was under observation showed so many complicating lesions, that an exact diagnosis was only made late in the disease—too late, in fact, to prevent a fatal termination.

The patient was a male, age 31, who presented at the New York Eye and Ear Infirmary on the 17th of January, 1904, with the following history: He had never had any previous illness, had been a moderate drinker, and denied specific history; family history was good. For a week before the patient came under observation, he had been suffering from severe pains in the left ear, which had followed an attack of grip. The ear had been discharging for three days before he came under observation. On his way to the hospital he had a severe chill. The examination on admission, was as follows: The right ear was normal. Upon the left side the external auditory meatus was found to contain a slight amount of seropurulent discharge. The drum membrane was bulging posteriorly, and presented a small perforation below and in front. The upper, posterior wall of the external auditory meatus sagged downward into the lumen of the canal. There was some tenderness over the mastoid antrum, and acute tenderness over the tip, extending for a considerable distance behind the tip. The patient was immediately put to bed, and under general anaesthesia, a free incision made through the left drum membrane and the sagging portion of the canal wall. An examination of the chest on admission, revealed slightly diminished breathing and resonance over the right lower lobe anteriorly, dullness over the right lower lobe posteriorly, with diminished breathing, and a few crepitant rales; breathing slightly diminished and slight dullness over the left lower lobe posteriorly;

\* Read at the Tenth Annual Meeting of the American Laryngological, Rhinological and Otological Society held in Chicago, May 30, 31 and June 1, 1904.

heart perfectly normal; abdominal organs normal. The temperature rose immediately after admission, to  $106^{\circ}$ , and the symptoms in the chest steadily increased, so that on the following day the patient had a well-marked pneumonia upon the right side, involving the lower lobe, and a beginning pneumonia upon the left side, involving the lower lobe. The ear drained freely, and although there was considerable mastoid tenderness, operation was out of the question on account of the condition of the chest. An examination of the discharge from the ear showed streptococci. An examination of the sputum two days after admission, showed abundant pneumococci. From Jan. 17th until Jan. 28th, the patient ran a temperature fairly characteristic of pneumonia; that is, the patient apparently defervesced upon the 12th day of the disease. The temperature at this time dropped to  $100^{\circ}$ , but in the course of a few hours rose immediately to  $105\frac{1}{2}^{\circ}$ . There was then a remission on the next day to  $100^{\circ}$ , with another rise. These fluctuations in temperature continued for several days. Throughout the course of the pneumonia, sponge baths were given whenever the patient's temperature reached a point above  $104^{\circ}$ , and this measure seemed to control the temperature fairly well. I should have said that at the time the patient first came under observation, he complained of some pain in the right knee-joint. This was treated by local applications. After the twelfth day, when the chest had seemed fairly clear, the remission in temperature naturally suggested the presence of some septic focus. As the chest had not entirely cleared up at this time, I requested Dr. Katzenbach, a well-known authority on diseases of the chest, to examine the patient. He told me that the examination of the chest was practically negative, and that he simply found signs of a preceding pneumonia, which had practically resolved. I had thought that there might be a focus of pus in the chest, and simply wished to have this excluded. At this time, February 1st, the aural symptoms had practically cleared up. The patient complained of absolutely no pain in the ear, the drum membrane had entirely healed, there was no discharge from the canal, and there was no mastoid tenderness, excepting just at the tip of the mastoid, and in the neck just below the tip; there was no tenderness in the neck below the angle of the jaw, and practically no swelling of the glands along the anterior border of the sterno-mastoid muscle could be made out upon palpation. Taking into account the fact that the patient had had a streptococcus infection in the ear, that the mastoid tenderness had never entirely disappeared, that he was running a septic temperature, and that any accumulation of pus could be excluded as the result of the pneumonic process within the chest, I made up my mind that the jugular bulb

must be the site of infection. I therefore, on the 5th of February, placed the patient upon the operating table and opened the left mastoid. The mastoid cells contained no pus, with the exception of a few cells at the tip, where a few suspicious drops of fluid were seen, although the bacteriological examination showed that the fluid was absolutely sterile. A blood count taken three days before the operation, showed no leucocytosis. The lateral sinus was exposed, in spite of the fact that the mastoid cells contained no pus, and was found to be occluded by a clot. The sinus was rapidly exposed from the knee to just above the bulb. In exposing the vessel in this latter situation, and upon removing a piece of bone by means of the rongeur forceps, about two drachms of thick pus escaped from the region of the bulb; in other words, the bulb had been the seat of a clot, which had broken down and had perforated the wall of the sinus. The sinus was then freely split up, and an attempt made to establish free bleeding by the introduction of the curette downward into its lumen. No bleeding followed the use of the instrument. The curette was then carried in the direction of the torcular, and free bleeding established after the removal of the clot. The wound was then packed with iodoform gauze, and the jugular was exposed by an incision extending from the sternal attachment of the sterno-mastoid muscle to just above the angle of the jaw, following the anterior border of the muscle. The omohyoïd muscle was divided, and the sheath of the vessels exposed. The sheath was covered by a number of enlarged lymphatic glands, which had to be removed before the sheath could be opened. The vein was then exposed, ligated low down in the neck and divided between two ligatures; it was then rapidly dissected out, the facial and lingual branches being tied off and divided between two ligatures. During the operation, the patient's condition became very poor, and he required infusion and hypodermatic stimulation; for this reason, the vein was not followed as high up as I usually do in these cases, although it was divided not less than an inch above the origin of the facial vein. The wound in the neck was completely closed by means of interrupted sutures, and the patient put to bed. Immediately after the operation, the temperature fell to  $101^{\circ}$ , and on the following day it was normal and did not rise above  $101\frac{1}{2}^{\circ}$ . This low temperature continued for two days after the operation, when the temperature began to rise, and on the third day after the operation, reached  $102^{\circ}$ . On the fourth day the temperature was  $103^{\circ}$ . Dressing of the wound caused a fall to  $102^{\circ}$ , and on the fifth day after the operation the temperature was only  $100^{\circ}$ ; in the sixth day it rose to  $103^{\circ}$ , but fell almost immediately to  $101^{\circ}$ , and ran at this level for about two

days, when it slowly began to rise. The wound in the neck healed throughout by first intention, and union was perfect in about four or five days. On the 15th of February, ten days after the operation, the temperature suddenly went to  $106^{\circ}$ . The patient complained of pain in his joints, more marked in the left knee, but also involving at times, the left wrist, and the right shoulder. He was seen by a general surgeon, who thought there was a beginning osteomyelitis at the lower end of the femur. From this time on the temperature remained elevated, its lowest point being  $101\frac{1}{2}^{\circ}$ , on Feb. 16th, after which time it was never below  $103^{\circ}$ , and sometimes went to  $106^{\circ}$ . The patient was evidently suffering from profound general sepsis. A culture of the blood showed streptococcus. Several injections of anti-streptococcus serum were given, without effect, and also several infusions of a 1-5,000 solution of formalin. The patient was also stimulated freely, and the heart action continued fairly good. None of these measures seemed to exert the slightest influence upon the temperature, and the patient died on the 22nd of February, 17 days after the operation upon the jugular. I might say that several days before death, a tumefaction appeared in the neck over the point where the upper end of the jugular had been tied. This swelling was incised along the line of original incision, and a small amount of sero-sanguinolent fluid escaped. Apparently, there had been some infection from the lower end of the vein.

The case is an interesting one on account of the numerous complicating lesions from which the patient suffered, and the absolute impossibility, on account of the condition of the chest, of relieving him by operative interference, until such interference was too late.

The temperature chart appended, may be followed with interest.

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For the convenience of the reader, I append the following bacteriological notes:

January 17th, day of admission, aural discharge showed streptococcus infection.

Two days after admission, aural discharge showed streptococci and occasionally a diplococcus; on same day, the sputum showed abundant pneumococci.

On January 20th, the aural discharge showed a few well-marked streptococci, the diminution in the quantity being undoubtedly due to the bichloride irrigation which had been kept up since the patient's admission to the hospital.

February 1st, the sputum showed mixed microorganisms, the pneumococcus predominating; no tubercle bacilli were present.

On February 2nd, examination of the blood:

Red cells, . . . . .	4,800,000
White cells, . . . . .	2,700
Hemoglobin, . . . . .	45%
Polynuclear cells, . . . . .	55.5%
Large mononuclear, . . . . .	30%
Small mononuclear, . . . . .	12.5%
Eosinophiles, . . . . .	5%

Cultivation from blood showed streptococcus pyogenes.

February 5th, blood count taken at time of operation:

Red cells, . . . . .	5,240,000
White cells, . . . . .	6,100
Hemoglobin, . . . . .	46%
Lymphocytes, . . . . .	20.75%
Large mononuclear cells, . . . . .	12%
Polynuclear cells, . . . . .	66.75%
Eosinophiles, . . . . .	5%

Mastoid pus at time of operation, negative; pus from sinus showed streptococci.

17 West 46th Street, New York.

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**Membranous Croup, with Report of Cases—J. T. HERRON—**  
*The Medical Age*, May, 1904.

The differentiative diagnosis between membranous croup and true diphtheria is the difference in their severity. The former has for its bacillus the streptococcus longus, streptococcus pyogenes and the staphylococcus; while true diphtheria has the Klebs-Loeffler bacillus.

A view of the membrane can be had, in most all cases, with the laryngeal mirror. Frequently the gagging of the patient causes pieces of the membranous exudate to fall upon the mirror, thus confirming the diagnosis.

Antitoxin is the remedy in all cases, followed by intubation when necessary. STEIN.

## CASES ILLUSTRATING DIFFICULTIES IN DIAGNOSIS OF INTRA-CRANIAL EXTENSION OF SUPPURATIVE OTITIS, IN THE PRESENCE OF A PUL- MONARY COMPLICATION.

BY ARTHUR B. DUEL, M.D.

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Reported cures of intra-cranial involvement in suppurative otitis media have become so numerous in recent years, that many recoveries, which ten or fifteen years ago would have been looked upon as wonderful surgical triumphs, are now accepted as a matter of course. Results are none the less brilliant now, but early recognition, and consequent early operation, has resulted in the publication of so many successful cases, that they are no longer considered unique.

The symptoms pointing to an extension of a suppurative process from the middle ear to the mastoid cells, or beyond them to the intra-cranial structures, have been so carefully noted, that one who is familiar with such conditions is not often at loss to appreciate the necessity of early operative interference, *provided there is no concomitant disease in other organs to interfere with the diagnosis.* For instance, a suppurative otitis media being present, one does not hesitate to enter the mastoid cells when the patient has deep seated pain, tenderness over the mastoid antrum or tip, and sagging of the postero-superior canal wall. In the majority of cases all these symptoms are present, and in addition there is usually a rise in temperature and pulse, however, not finding all these symptoms one *frequently operates* when one or two of them are present, the general aspect of the patient making it seem advisable.

Extension of a suppurative process from the mastoid cells to the adjacent intra-cranial structures is usually accompanied by unmistakable symptoms. Even though "*typical symptoms*" of extension are *not* present, there may be other conditions to justify operative intervention; e. g. the patient not doing well; the trouble *being evidently confined to the ear and its surroundings*; one is frequently led to operate in an *exploratory* way *early*, rather than hesitate too long for confirmatory signs. The mastoid cells having been removed it is not difficult to explore the neighboring intra-cranial

structures. An early exploratory operation, in such a doubtful case, has often averted a fatal termination which would have resulted from waiting for more certain indications.

It is an *entirely different problem, however, when a concomitant disease is present, or developing, to determine whether certain changes of temperature, pulse, respiration, and alterations in the blood, are due to extension of the process in the mastoid to adjacent structures, or to the other pathological condition quite remote from there.*

It can be easily seen, for instance, how, doubtful physical signs of sinus thrombosis or epidural abscess being present, a high leucocytosis, or a blood culture showing the presence of bacteria, might lead one to operate, if there were no symptoms pointing let us say to a possible pneumonia; while, with any symptoms even vaguely suggesting the pulmonary complication, such an investigation, if positive, would still leave one in great doubt as to the source of the leucocytosis, or blood infection. In support of this idea permit me to report briefly three cases selected to show the uncertainties which may occasionally arise.

*Case I.* H. W., a girl, 6 years old, under the care of Dr. J. W. Brannan for broncho-pneumonia, developed an acute suppurative otitis on the left side, about the middle of February, 1901. Paracentesis was performed. The patient recovered from the bronchopneumonia, all physical signs disappearing in a fortnight. The ear continued to discharge, and, owing to formation of granulations in the middle ear, on March 4th, 1901, under nitrous oxide, a curettage was performed to improve drainage from the attic. On March 12th, owing to pain and tenderness over the mastoid, a mastoectomy was performed. Pus and granulations were found in the antrum and throughout the mastoid cells, all of which were removed. The temperature chart from the date of operation is shown.

On account of the previous broncho-pneumonia chloroform anaesthesia was used, in the hope that it would be less irritating to the pulmonary mucous membrane. Nevertheless, from the hour of operation, through all the vacillations of temperature following in the next few days, the nurses notes constantly recorded a violent and incessant cough. Despite this fact Dr. Brannan was unable at any time to find any definite signs in the lungs to account for it. On the second day following the operation the temperature rose to  $105.6^{\circ}$  F. where, with slight variations, it remained for 24 hours. The respirations during this time were from 30 to 40 per minute, and the pulse from 120 to 160 per minute. The temperature then dropped in a few hours to normal, and again rose to  $105.6^{\circ}$  F.

where it remained for 48 hours. The respiration went down to 20 to 30 per minute and the pulse to 120 to 140 per minute. At this time Dr. McKernon saw the case with Dr. Brannan and myself. There was no complaint of pain in the head. There was some tenderness complained of on pressure along the course of the jugular on the left side, but in a child of six years this was difficult to determine accurately. The wound looked healthy. A small area of the sinus exposed at the original operation was covered with apparently healthy granulations. Dr. McKernon was inclined to attribute the symptoms to trouble in the lungs, rather than to an intra-cranial extension, with which opinion I concurred. That night the temperature dropped to normal, and by one o'clock the following day had risen again to 106° F. Dr. Walter B. James, consulting with Dr. Brannan, was unable to discover sufficient physical signs in the lungs to account for the temperature, and advised further consultation with regard to the ear. Accordingly Drs. McKernon and Dench saw the case with Dr. Brannan and myself again that evening. All were agreed that the chart was very unlike one of sinus thrombosis, and Drs. Dench and McKernon were inclined to wait for 12 or 24 hours longer for further developments. Owing to the fact that neither Dr. Brannan nor Dr. James could find signs in the lungs to account for the temperature I asked permission to explore the sinus. To this they agreed, and accordingly, I operated at once. A disintegrating thrombus, extending from beyond the knee to the jugular bulb, was found. Before attempting to remove it, the jugular vein was tied off just above the clavicle and dissected out to the bulb. Along the course of the vein, the glands, which were beginning to enlarge, were removed. The sinus was opened, the disintegrating thrombus removed; the walls curetted, and packed with iodoform gauze. The incision in the neck was closed at once, and healed by primary union. The temperature dropped to 97.4° F. immediately following the operation, and 12 hours later rose to 105.6° F. Within 24 hours it had reached normal again where it remained. The convalescence was uneventful.

The difficulty in this case was that the incessant cough, coming on directly after the operation, in a case where there had been a previous distinct broncho-pneumonia, with conditions of temperature, pulse and respiration very similar to those present (which eventually proved to be due to the sinus involvement) naturally led us to suspect a recurrence of the pulmonary lesion, rather than a sinus thrombosis. Had there been a chill with each rise of temperature, and a profuse sweat with the drop; in the absence of very definite pulmonary signs, the diagnosis of sinus thrombosis would have been

more probable that even these added signs of profound sepsis are still insufficient to make a *certain differential diagnosis* is shown by the following case:

*Case II.* Mrs. B., on the last of January, 1904, developed a case of grippe, with acute catarrhal symptoms in the naso-pharynx, and a slight bronchial irritation. On February 2, owing to acute pain in both ears, Dr. Reuel B. Kimball asked me to see her in consultation. Both drums were bulging. The right mastoid was exquisitely tender on pressure over antrum and tip. Under chloroform anaesthesia both drums were freely incised. Smears taken from the ears, directly after incision, showed presence of streptococci, and a diplococcus resembling the pneumococcus, in both. The temperature, which was 101° F., dropped to normal in a few hours. The mastoid tenderness had entirely disappeared within 24 hours. I did not see her again for 48 hours, being assured by Dr. Kimball that there was no pain or tenderness in the mastoid. A "slight feeling of chilliness" had been experienced when the temperature rose to 102.4° F. (see chart). During the interval between that and the second slight chill there had been two vacillations in temperature of about two degrees. Examination of the ear showed both to be discharging freely; there was no pain; no tenderness on pressure over the mastoid region. A slight bronchial cough was present. In 8 hours from this time the temperature had dropped to sub-normal with profuse perspiration, and, a few hours later, with a *severe chill* lasting one half hour rose to 105.8° F. No *physical signs over the mastoid, or sinus, or along the course of the jugular*, showed any evidence of thrombosis. The respirations were 32 per minute, the pulse 116 per minute. Dr. Kimball was unable to find any signs in the lungs except an occasional rale in the larger bronchi. Dr. Janeway and Dr. McKernon were called in consultation. We were all agreed that the diagnosis lay between a developing pneumonia and thrombosis of the lateral sinus, or jugular bulb, and that, in the absence of any physical signs of the latter, it was wiser to wait further developments. A blood count, made at this time, showed a leucocytosis of 42,000. In six hours the temperature dropped to 103.5° F. and then, with a slight chill, rose again to 105° F. The respiration at this time had gone down to 22 per minute; the pulse to 100 per minute. Frequent cough was present, and by the next morning, when Dr. Janeway saw the case with Dr. Kimball any myself again, the sputum was "so typically pneumonic" (blood stained) that it was considered sufficient confirmation of the diagnosis of pneumonia, although *no further physical signs in the lungs were found*. Twenty-four hours after the severe chill a drop in temperature to 99° F., with profuse

perspiration, occurred. The pulse went down to 80 per minute; the respiration to 20 per minute. The ears were discharging freely, and, no mastoid tenderness being present, I did not see the patient again for some days, a diagnosis of pneumonia having been made. Four hours after the last sudden drop in temperature to 99° F. a chill occurred with a rise in temperature to 106° F. In eight hours it dropped again to normal with a profuse sweat and never rose again above 100, the patient making an uneventful recovery, *without cough or expectoration*. At the end of a month I saw the patient. Both drums were healed; the hearing was acute; there was no tinnitus.

The difference between this case and the preceding is most striking. Here a distinct chill marked each rise of temperature; a profuse sweat occurred with each drop. Except for the local physical signs, the whole aspect of the case was one of sinus thrombosis. Yet a diagnosis of pneumonia was made on the presence of blood stained sputum, although auscultation signs were as little characteristic of pneumonia as were the local signs of intra-cranial extension.

My own belief, now that recovery is complete, is that a thrombus had formed in the lateral sinus, and that the patient was strong enough to overcome the doses of septic poison which were thrown from it into the circulation. Certainly the chart is typical of sinus thrombosis, and the local signs were no more definite of one than the other. A third case presents interesting features in a different way.

*Case III.* January 29, 1904, I was asked by Dr. John S. Thachar to see Miss C., 17 years of age, who had in the course of a catarrhal pharyngitis, developed an ear-ache in the right ear. The temperature was 101.8° F. The right drum was red, lusterless, and bulging. Under nitrous oxide the drum was freely incised. A smear, taken directly after incision, showed the presence of streptococci. There was marked tenderness over the mastoid antrum. Twenty-four hours later, owing to increasing tenderness, and marked sagging of the posterior-superior canal wall, mastoidectomy was performed. Pus and granulations were found throughout. There was no destruction of the bone. The sinus and dura in the middle cerebellar fossa were not exposed. Following the operation the temperature rose to 102° F., dropped in 12 hours to 100° F., and the following 12 hours rose to 104° F. Vacillating between 103 and 104 for 12 hours it rose to 104.6° F. There was no pain in the head; nothing could be found in the lungs; respirations were 18 to 20 per minute; pulse 112 to 120 per minute. The wound was dressed and looked perfectly clean throughout. Blood count showed a leucocytosis of more than 20,000. Dr. McKernon saw the case with Dr. Thachar and myself. No definite evidence

either of intra-cranial or pulmonary involvement being found it was decided to wait for further developments. Twenty-four hours later, nearly 70 hours from the initial rise in temperature typical signs of lobar pneumonia were found by Dr. Thachar in the right lung. On the 5th day the temperature reached normal by crisis. There had been very little cough, and practically no expectoration. For five days the patient progressed very satisfactorily; a slight afternoon rise in temperature of about 100 occurring, and resolution taking place very rapidly. The mastoid wound looked healthy and was filling rapidly with healthy granulations. Then began a most interesting fluctuation in the temperature (shown in chart) rising each day a little higher for ten days, the highest point reached being 103.6° F. and dropping in the morning to normal, or a little sub-normal. There was no chill, and no profuse perspiration. There was no evident enlargement of the spleen; no abdominal tenderness; no pain anywhere, no cough or expectoration. Repeated examinations of the blood by Dr. Thachar and his assistant, showed always a leucocytosis of over 20,000. No widal reaction. No plasmodium malariae. A culture of the blood was negative. The urinary examination was negative. Dr. Walter B. James saw the case in consultation, and felt inclined, despite the slight physical signs present, to regard the peculiar temperature as due to slow resolution in the lung.

As will be seen by the chart, after 10 days of this daily exacerbation and remission of temperature, it became normal, and remained so. The patient made an uneventful recovery.

Here delayed physical signs of pneumonia for 70 hours, following a mastoid operation, made us extremely anxious about the possibility of an intra-cranial extension, although local signs were absent.

Again, after the pneumonia had so far cleared up as to give no further physical signs, a septic temperature for 10 days, placed us in grave doubt for a second time.

254 Madison Avenue.

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**Inhalation of Menthol in Catarrh of the Nose and Throat—**

GELLHAUS—*Monatsschr. f. Ohrenh.*, Berlin, July, 1904.

The author describes an apparatus which he has devised for the inhalation of the vapor of menthol crystals. YANKAUER.

## SOME REMARKS ON BEZOLD'S MASTOIDITIS WITH A REPORT OF THREE CASES.

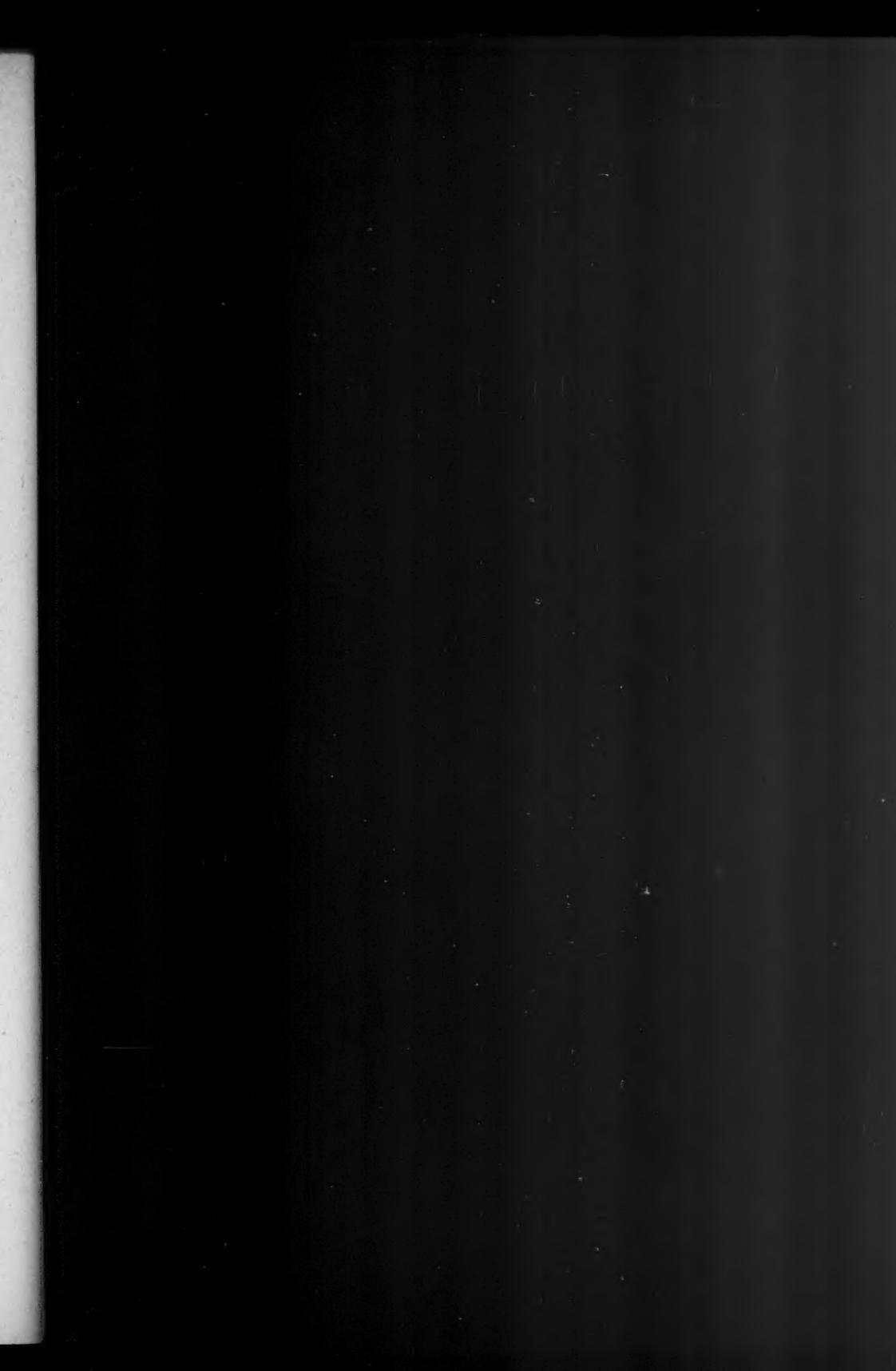
BY SEYMOUR OPPENHEIMER, M.D., OF NEW YORK.

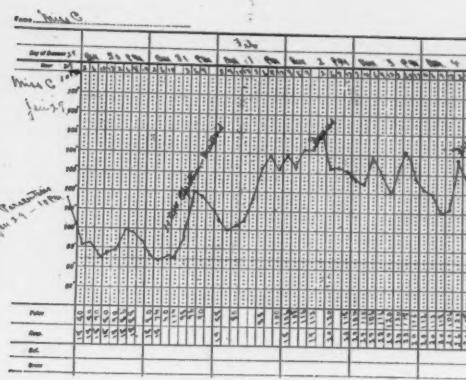
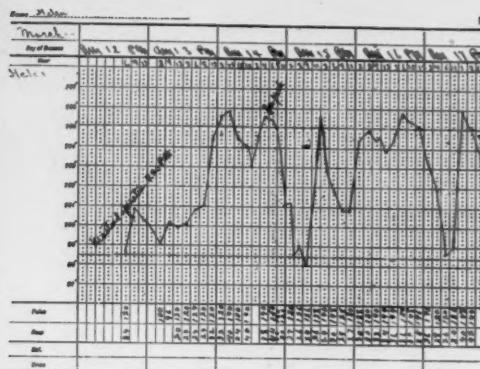
Laryngologist and Otologist, Mt. Sinai Hospital Dispensary; Orologist, Gouverneur Hospital;  
Laryngologist, University and Bellevue Hospital Medical College Dispensary; Instructor  
in Laryngology, University and Bellevue Hospital Medical College, etc., etc.

The presence of pus in the cervical tissues following either acute or chronic mastoiditis, as has been pointed out by Fougeray, may occur in three ways either by direct irruption from the mastoid cells; by way of the venous channels, or by traversing the lymphatic system of this region. It is, however, with the first of these only that we are here concerned, and it is desired to report three cases of this form of mastoiditis and to emphasize especially the results obtained by radical treatment.

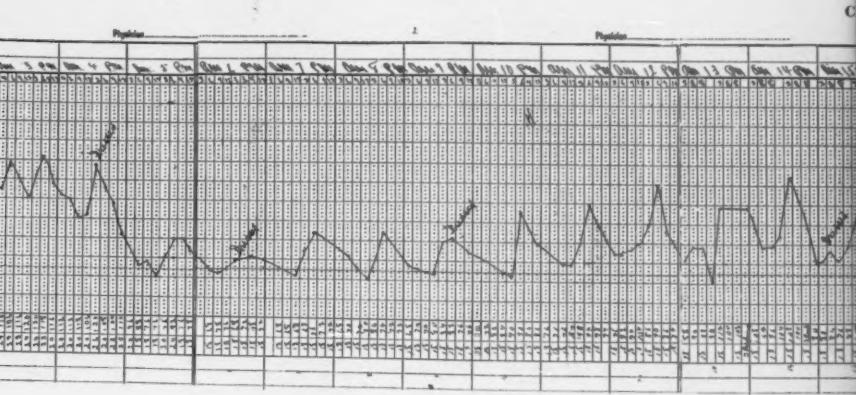
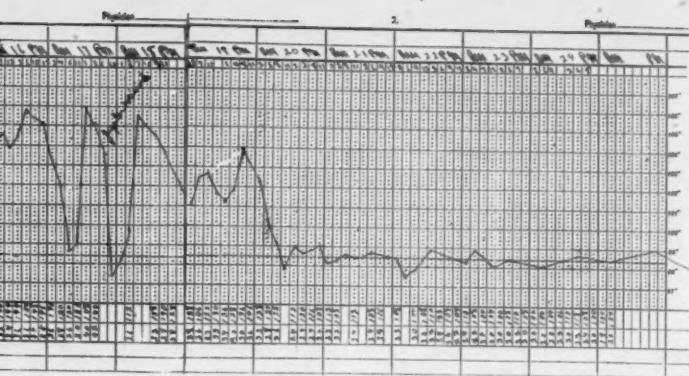
Occurring usually as a result of acute purulent otitis, perforation of the medial plate of the mastoid also takes place in long standing cases of pus collections in this portion of the temporal bone, and as a result of its construction, such cases seem to be unusual under the age of six years, although Lermoyez reports a case successfully operated, in a child of but two and one half years. While these sub-facial consecutive abscesses occur in but a small proportion of mastoid inflammations, yet Collinet was able to collate two hundred reported cases and it seems probable that such cases are more frequent than the literature would lead one to believe. The extension of the purulent inflammation to the soft tissues below the mastoid process, indicates that the pus in the bone has escaped either through a pathological opening or by way of a congenital defect, the former being practically the usual method. This is especially liable to occur when the inner wall of the mastoid tip is very thin and rapidly disintegrates, allowing the pus to discharge into the digastric groove and also in those mastoids in which the lower group of cells consists of large thin walled osseous bulla, or where the pneumatic spaces situated inferiorly and medially are covered by an extremely thin layer of osseous tissue. At the same time the tendency of the pus to extend in this direction is also enhanced if the cortical layer of the mastoid be thick and solid.

If the mastoid empyema be neglected, the pus will find its exit in various directions, through the cortex; into the cranial cavity; into the lateral sinus; or into the sheath of the muscles that are inserted into the mastoid tip, but it is the latter form which Bezold charac-

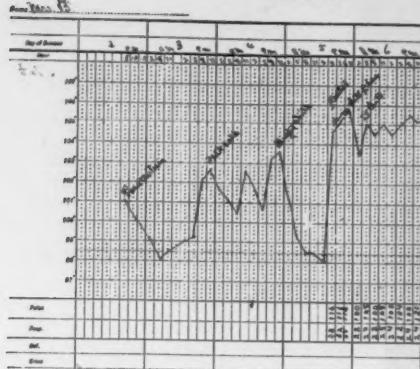




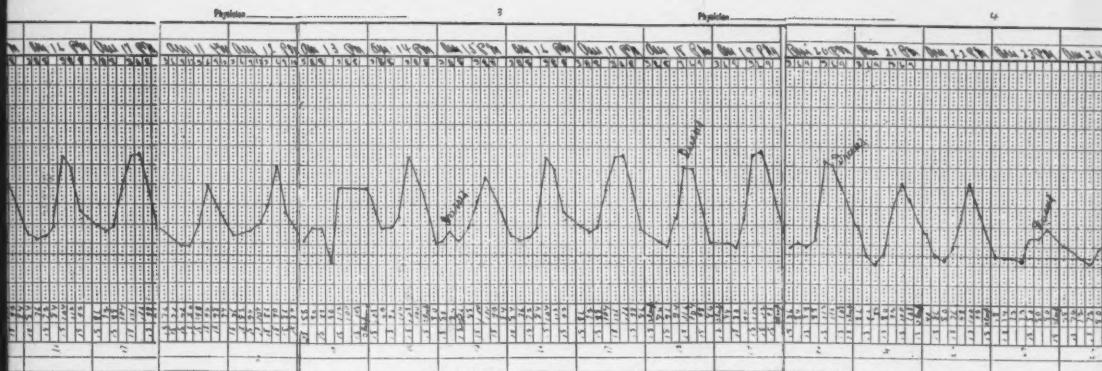
CASE I.



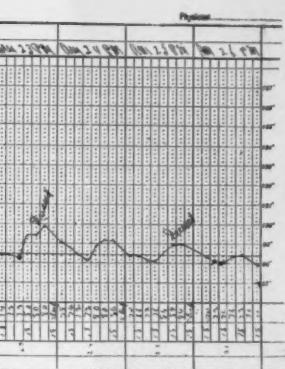
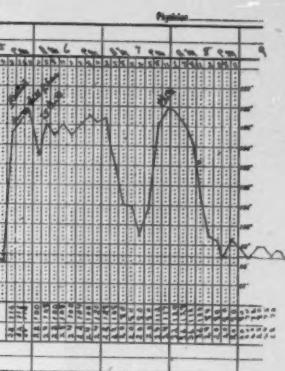
**CASE 11.**



SE III.



11.





terized, and the term Bezold's mastoiditis should be restricted to this variety alone. In some cases, the perforation in the bone shows only as a small opening in the lower medial wall of the tip, while in others, which are much more grave in character, there is also a tendency towards intra-cranial complications. Knapp has especially noted this factor of additional danger, as shown in a case reported by Luc, where the disease terminated fatally with symptoms of encephalic abscess, and, in another instance recorded by Day, there was ulceration and loss of both eyes, probably due to thrombosis of the cavernous sinus, while Moure states that the perforation of the point of the mastoid with burrowing of pus into the soft tissues of the neck does not always exist alone, as whenever he found the point of the mastoid perforated or about to perforate, there was also necrosis of bone in other portions of the cavity. In 76 mastoid cases operated by him, he found in 16 that Bezold's variety was accompanied with perforation of the internal table usually at the level of the sinus, but sometimes it was near the upper part of the antrum or towards the osseous auditory canal, and, whenever he has found this condition, the exposed part of the meninges was always bathed in pus and covered with fungous granulations. While the presence of other and more serious complications is shown in a case of Tissot's where the mastoid and sterno-mastoid regions showed edematous swelling, redness, fluctuation and pus appeared in the external auditory canal when pressure was made over the swelling. Radical operation was performed, with death six days later, and autopsy showed the presence of a diffuse meningo-encephalitis and a subdural abscess of the temporal fossa. While in a case reported by Lewis, with a successful termination, operation revealed a cholesteatoma of the entire mastoid, with an eroded area in the floor of the middle cerebral fossa, another in the wall of the sigmoid fossa and an opening along the digastric groove leading into the abscess in the neck.

Of the cases of Bezold's mastoiditis, which I here wish to report, the following presented other complicating factors besides the cervical pus collection:

*Case I.* J. E., male, age 31 years. No trouble with ears previous to eleven weeks ago when following epidemic influenza there was acute suppuration in the left ear with but little discharge. At no time during this period was he free from pain, and, after nine weeks from its inception, the pain over the mastoid diminished to some extent and a swelling was noticed on the same side of the neck; he then came under my observation, and examination showed a perforation in the upper anterior segment of the membrana tympani with con-

siderable pus in the canal. The posterior canal wall was bulging, the auricle was prominent, and, in addition to the usual symptoms of an extensive mastoiditis, there was considerable swelling at the apex of the mastoid under the sterno-mastoid muscle. This was tender to the touch and light pressure upon it would cause pus to flow from the perforation in the membrana tympani. There was considerable pain over the entire side of the head, but no recognizable symptoms of any intra-cranial complication. He had lost 12 pounds in weight, had little appetite, suffered from insomnia and, in general, he presented the appearances of septicemia.

Radical operation was advised, and, under ether anaesthesia, the usual mastoid incision was made extending, however, well out to the tip of process. The bone was completely disintegrated, filled with pus and debris, while a large ragged sinus was found opening into the digastric fossa and communicating with the abscess in the neck. The mastoid was entirely cleaned out and with the antrum and middle ear, was thrown into one large cavity; at this time, additional pus welled up in the field of operation and the dura over the internal wall was exposed, covered with purulent material. After the necrosed bone had been removed, an incision was made in the neck over the most prominent part of the swelling and about a half ounce of pus was evacuated deep under the sterno-mastoid. The wound was irrigated with a 1.5000 bichlorid solution, which flowed out through the external canal, and the parts were then packed with iodoform gauze and the usual dressings applied. The course of the case was uneventful subsequently and the results of the evacuation of pus and removal of necrosed bone was seen in the complete restoration of health with but slight impairment of hearing.

When the pus escapes through the spontaneous opening in the medial plate of the mastoid, it is poured out in the digastric fossa under the insertion of the muscle; it may then find its way, as is usually the case, down along the sterno-mastoid at the same time infiltrating it as may be seen in some operated cases, when after the muscle has been detached from the bone, pus will ooze from its upper end when it is stroked from below upwards. Or it may find its way forwards along the tract of the digastric muscle and point in the pharynx, or backwards towards the nucha and spinous processes of the cervical vertebra, but always remaining beneath the deep fascia of the neck. An interesting case being reported by Dun, with purulent mastoiditis, epidural, subpetrous and postoesophageal abscesses, with death from presumably internal hemorrhage. Pain in the ear had lasted for five weeks but there was no discharge at any time. Ten days after the mastoid operation, there was swelling at

the upper end of the sterno-mastoid muscle, but incision showed no pus. Further operation revealed intra-cranial complications, but there remained great pain on swallowing and when the neck was moved and the swelling under the sterno-mastoid muscle increased in size and pressure over it caused pus to flow from the antrum. This abscess was then opened, but two weeks later the abscess in the neck burst into the cesophagus. Burnett also reports a case where the pus extended in the pharynx behind the superior constrictor muscle and was evacuated through an incision beneath the jaw; the mastoid operation being first performed.

After the pus has escaped into the neck, it shows no tendency towards spontaneous evacuation, but forces the insertion of the mastoid muscle outwards and on account of the resistance of the deep cervical fascia, there exists a constant tendency to burrow inwards, with the development of septicemia or pyemia especially if it discharges into the lung or pharynx. It may also extend to the lateral regions of the neck or "depression abscesses" arise, which may hasten a fatal termination from the development of pyothorax or compression of the trachea, the former condition resulting from the extension of the pus along the muscles to the clavicle and into the anterior or posterior mediastinal spaces. As in general the pus follows the planes of the cervical fascia, it is apt to extend between the muscles and along the sheaths of the larger vessels, while in rare cases there is a tendency to extend backwards towards the region of the splenius muscle, a case being reported by Swain, in which a trapezius abscess was formed, complete recovery following trepanation of the mastoid and drainage of the abscess by counter openings.

The second case, which it is desired to report, occurred as the result of an acute purulent otitis and seems of special interest both on account of the rapidity of the morbid process and the promptness of recovery following evacuation of the purulent material.

*Case II.* G. B., male, age 20 years. No previous trouble with ears and apparently in good health until after an attack of coryza, pain in the left ear developed. This was treated with various home remedies with more or less relief for a week, when the acute pain subsided and a feeling of discomfort ensued over the mastoid region. This condition remained in *statu quo* for two weeks longer without any treatment, when a small swelling occurred at the tip of the mastoid and co-incident with its appearance all uncomfortable sensation disappeared for three days, when intense pain developed, being localized over the tumor. I saw him then for the first time and found a fairly robust man with his head inclined towards the affected side and at the top of the

sterno-mastoid muscle there was a small swelling in intimate connection with the tip of the mastoid process, while the muscle itself seemed somewhat swollen in its upper third. Pressure upon the tumor was extremely painful, while over the mastoid firm pressure produced no ill symptoms except at the tip and over the antrum. The membrana tympani was congested but not perforated and appeared to be much thickened and bulging slightly in the lower segment. He was advised that an operation was necessary, but he refused and would allow only a paracentesis of the drum which allowed a few drops of thick pus to escape, but was productive of no relief. He was then not seen again for five days when he returned and agreed to operation, as he had used poultices over the swelling in the neck since his last visit with an increase in the size of the swelling and augmentation of the pain.

The usual mastoid incision was first made and the cortex was found to be extremely hard but apparently normal. No pus was found until the antrum was reached, when a few drops were removed and the parts cleansed, but little necrosed bone being found. The operation on the mastoid was temporarily discontinued at this point and a two-inch incision was made in the neck over the tumor, the sterno-mastoid being detached in part from its insertion. The muscle at its upper end was found to be partially infiltrated with a semi-purulent fluid, while underneath it in the digastric fossa, a dram of pus was evacuated and a small sinus was found in the bone. This was enlarged and the pneumatic spaces in the mastoid were broken down until a free opening was established in the antrum communicating with the aditus and middle ear. The mastoid wound was packed with iodoform gauze and the neck incision was closed excepting a small space at its inferior border, into which a gauze drain was inserted. The usual dressings were applied, and, as there was complete relief from all the symptoms the drain was removed from the neck on the fourth day, while the mastoid wound rapidly healed without any untoward symptom.

The pathognomonic signs of the extension of pus into the digastric fossa are usually well marked and fairly characteristic. After the pain in an acute otitis has lasted for several days or even longer with varying intensity, there usually occurs a sudden diminution or perhaps an entire cessation; the otorrhœa continuing in some cases while in others it diminishes considerably in amount. Within a day or so following this apparent improvement, a swelling becomes evident at the apex of the mastoid under the insertion of the muscle, this shows a tendency to increase in size and extends backwards towards the nucha or downwards along the course of the sterno-mastoid mus-

cle. During its inception examination may show no apparent difference between the two sides of the neck but later the diffuse, brawny swelling involves the entire insertion of the muscle and often the adjacent areas, while its limits are not usually well defined. Occasionally the symptoms bear a close resemblance to the early stages of sigmoid sinus thrombosis, but the swelling develops rather rapidly as a semi-flat tumor, while the skin over it is normal at first, later becomes infiltrated, red and firmly attached to the underlying tissues.

The head may or may not be inclined towards the affected side depending upon the degree of involvement of the muscle, while pain again becomes marked and is usually exaggerated by even slight pressure upon the cervical enlargement. As Dench has stated, in some cases where the pain is not marked, deep pressure over the tip of the mastoid will elicit this symptom, but in the early stages it is apt to be considered neuralgic in character and dependent upon the tympanic lesion. The most characteristic phenomena, however, is that when pressure is made over the swelling in a considerable number of the cases, the pus can be forced through the opening in the digastric fossa, through the mastoid cells, antrum and tympanic cavity and out into the external auditory canal. Mendel records a case in which this symptom was well marked, while in a case seen by Guye, pressure over the cervical swelling brought forth pus from a fistula in the posterior meatal wall and in a case of Waggett's a jet of pus could be forced through the perforation in the membrana tympani by such pressure.

The third case of Bezold's mastoiditis, which it is here desired to report, is as follows:

Miss K. T., age 23 years, had scarlet fever at 8 years, followed by chronic suppurative otitis media. The right ear discharged to a much less extent than the left and for the past few years has seemed to be entirely well. The left ear has always discharged an offensive pus, which has been more or less relieved by treatment at irregular intervals. She stated that six months ago the discharge ceased entirely and at the same time considerable pain developed over the mastoid region; this was followed in one week by a return of the discharge and the pain became merely a "soreness." This phenomena appeared and disappeared off and on until three weeks ago, when the discharge from the ear entirely ceased, the pain also disappeared and within twenty-four hours a swelling in the upper part of the neck made its appearance, which was slightly tender at first but rapidly became exceedingly painful. Examination at this time showed a

large swelling at the tip of the mastoid and extending down along the sterno-mastoid muscle for at least half its length, it was extremely sensitive to pressure and the skin over it was red and oedematous. The mastoid was also sensitive to pressure but in a much less degree, while the tympanic cavity was filled with a thick caseous pus, but the membrana tympani and ossicles had been destroyed by the long continued suppuration. Her general condition was decidedly poor evidently from pus absorption, but no evidence of extension of the infection to the cranial contents could be elicited.

She was advised to have an operation, and, under ether anaesthesia, a Stacke operation was done which showed extensive disorganization of the mastoid cells with a large opening into the digastric groove. Pressure on the neck over the upper part of the sterno-mastoid muscle at this stage, forcing considerable quantities of pus out of the mastoid wound. After the necrosed bone had been removed and the mastoid operation completed, an incision was made in the neck and about an ounce of offensive pus evacuated; the sterno-mastoid muscle was, however, infiltrated with pus. The mastoid was then packed in the usual manner, and, on account of the extensive infection of the cervical tissues, a large opening was left in the lower part of the incision here to provide for free drainage, after the parts had been thoroughly cleansed with a 1.5000 bichlorid solution. The patient reacted well after the operation and the temperature remained below 99 degrees with both the mastoid and cervical wounds looking healthy until the sixth day, when there was a rise in the temperature to 102 degrees and she complained of considerable pain in the neck. While there was a free discharge from the wound, there was some bulging deep down in its lower third, and, after etherization, it was found that the cause of the trouble was a pocket containing about a dram of purulent material and disintegrated muscle tissue, well beneath the sterno-mastoid; this was evacuated, cleansed and packed, and in two weeks the drain was entirely removed from the neck with a perfectly satisfactory result, the mastoid also healing without any trouble.

As has been previously pointed out, the recognition of this complication of mastoid empyema presents but little difficulty in its later stages, the probability of this condition being present being enhanced if the characteristic tumor forms at the head of the sterno-mastoid muscle, while the integument over the mastoid itself shows little or no evidence of infiltration. Should pressure over the tumor cause pus to flow from the middle ear, of course, its recognition becomes at once possible; fluctuation of the cervical abscess owing to

its deep location and the small amount of pus usually present, can rarely be felt, and is, therefore, of practically no value as a diagnostic sign. Difficulties may, however, arise in its recognition, as in a case reported by Menière, where the perforation in the digastric fossa was not recognized until the mastoid operation was performed, while in an unusual case seen by Briege, the primary mastoiditis present was ten days later complicated by aural symptoms and a cervical abscess. It is important, however, to recognize the condition early, that prompt surgical relief may be obtained, and, also, on account of the concurrent tendency towards the development of intra-cranial complications in these cases.

In the study of the literature relating to the treatment of this complication, three methods of treatment have been recommended, first, by evacuating the abscess in the neck and ignoring the mastoid; secondly, by opening the cervical abscess and then performing a mastoid operation and thirdly, by reversing this procedure and performing the mastoid operation primarily and following the course of the pus through the bone fistula into the neck. This latter method being far preferable, as it possesses all the advantages of removing the entire diseased area in a thoroughly scientific manner, and further, is compatible with modern surgical procedures.

Burnett records a case in which the swelling extended down the sterno-mastoid muscle for about three inches and was most prominent towards the nucha, while pressure over it would force pus from the middle ear. An incision was made into the abscess and a dram of pus evacuated, while a probe showed a sinus leading from the abscess to an opening in the mastoid bone and which passed into the pneumatic spaces. Fluid syringed into the incision passed out through the external auditory canal, but the case recovered without operation on the mastoid. He further states that he has found in all cases after free incision in the soft parts with release of the pus, especially if fluid syringed either through the ear or wound escapes at the opposite end of the suppurating tract, that healing takes place promptly under a daily syringing of the tract with a 1 in 5000 bichlorid solution, without the necessity of opening the mastoid. One can hardly advise such a measure when necrosed bone must of necessity be present in the mastoid, and, in spite of a favorable result now and then, such cases must sooner or later present even more serious symptoms of the remaining tympanic and mastoid disease requiring a further operation than that which should have been performed originally.

Lichtwitz reports an instructive case illustrating the second method, in which the cervical abscess was first opened and then followed by

opening the antrum and mastoid cells, with a successful result. When such a procedure is adopted, an incision is made into the lower part of the neck abscess and the source of the pus is followed backwards to its source, when the mastoid is then opened at the suprarectal triangle, the necrosed tissue removed and a tampon and iodoform dressings complete the procedure. While no serious objections can be offered against this method, yet it appears to have the disadvantage of reversing what seems to be the natural order of procedure and from my experience I would strongly emphasize the importance of opening the mastoid as a primary procedure and then evacuate the cervical abscess as the location of the pus could be traced through the infected mastoid.

The technic of the operation consists in opening the mastoid cortex in the usual manner, and after exposing the antrum, removing the infected pneumatic cells and the passageway of the pus through the medial plate. At this point, the sinus should be sought for in the neck with a probe and a counter opening made at the lowest point of the pus collection; while in an occasional case where the cervical region is infected down to or near the clavicle, the incision should be made sufficiently extensive to allow of free removal of the pus. Besides the removal of the mastoid cortex, it is always good singly to remove the cells at the tip and detach the insertion of the sterno-mastoid muscle so as to allow thorough examination of the medial plate of the bone in the digastric groove. It is also necessary, especially in those cases where obscure symptoms are present possibly indicative of suspected intra-cranial infection, to carefully examine such suspected areas of infection in the bone and after the parts have been curetted and all necrosed tissue and debris removed, the affected areas may be cleansed with bichlorid or well mopped out with a zinc chlorid solution, especially the incision in the cervical region and then packed with cyanid or iodoform gauze, preferably the latter. Unless the cervical incision has been unusually extensive, when it should be packed with gauze in its entirety, it should be almost completely closed and a small gauze drain inserted into the fistulous tract. The dressings rarely require change before the third day and then the drain may from day to day be rapidly lessened, while this method is carried out in the usual uncomplicated case and the after treatment, as indicated, is based on general antiseptic surgical principles, the course of the after treatment will be materially shortened and entire recovery will ensue within a few weeks.

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## SOCIETY PROCEEDINGS.

### NEW YORK ACADEMY OF MEDICINE.

#### SECTION ON LARYNGOLOGY AND RHINOLOGY.

*Stated Meeting, Held November 4, 1904.*

DR. FRANCIS J. QUINLAN, Chairman.

The President announced the special address of the evening:

#### CANCER OF THE LARYNX.

BY SIR FELIX SEMON, C.V.O., M.D., BERLIN, F.R.C.P., LONDON.  
Physician Extraordinary to His Majesty, the King.

Mr. President and Gentlemen: The keynote of the observations which I shall have the honor of addressing to you was struck in a discussion on malignant disease of the larynx at the meeting of the American Laryngological Association in 1902, when Dr. Bryson Delavan stated that it was time "that the discussion of these subjects upon theoretical grounds should give place to careful studies of what was actually being accomplished by practical men." I feel that it might seem ungracious that in return for the magnificent hospitality of which I have been, and still am, the recipient in this country, I should criticise, as will be my duty, the emphatic views recently expressed on diagnosis and treatment of cancer of the larynx by an eminent American Laryngologist, my old friend, Dr. John MacKenzie, of Baltimore. But after mature consideration I have come to the conclusion that I can only do full justice to the task you have so kindly confided to me by endeavoring in the frankest possible manner to show the untenability of his objections to the methods by which British Laryngologists have obtained very satisfactory results in dealing with this scourge of mankind, I strongly feel that a scientific discussion of such a topic ought, after all, not to be of the nature of a mutual eulogium but an earnest endeavor to clear the atmosphere and let the better cause conquer.

Very little was known about the early symptoms and early laryngoscopic appearance of cancer of the larynx until a comparatively recent date, and as a rule its existence was only recognized when it was in an advanced stage. Up to 1878 many cases were in such cir-

cumstances treated by thyrotomy, an operation which though positively ideal in early stages is quite insufficient, as we now know, when the disease is more advanced. The results were naturally disastrous, and led, after Paul Bruns' sweeping condemnation in 1878 to almost complete abandonment for a time of thyrotomy of the larynx. The more severe forms of radical operation—total and hemi-laryngectomy, were enthusiastically welcomed when first introduced, did not at once justify the hopes which had been raised, and in the early eighties of the last century the outlook for the unfortunate patient afflicted with cancer of the larynx was grave in the extreme. Such is the barest outline of the state of matters before 1887. In 1886 I had, before the Clinical Society of London drawn attention to several so far unknown, or at any rate, undescribed laryngoscopic signs which had enabled me in various cases to diagnose laryngeal cancer at an earlier period than was at that time usual. Dr. Eugen Hahn of Berlin had also, already materially improved the technique, especially of partial extirpation of the larynx, and had by the invention of his excellent sponge cannula greatly diminished the mortality previously existing from septic infection of the lower air passages during and after operation. But these had remained isolated attempts, and there can be no doubt that the sympathetic interest with which the whole world followed the melancholy course of the Emperor Frederick's illness gave a sudden and universal impetus towards a closer study and better understanding of that formidable disease. First came the revival of that deplorable doctrine of the late Mr. Lennox Brown, viz., that benign laryngeal growths were specially liable to undergo malignant degeneration after intra-laryngeal operation. This was followed by the publication of my "Collective Investigation," undertaken with the help of most of the prominent laryngologists of the world, to test the truth of this assertion. About the same time Prof. Bernhard Fraenkel of Berlin published his remarkable paper, "Laryngeal Cancer, Its Diagnosis and Treatment," in which besides studying the histological characteristics of laryngeal cancer, he advocated anew in suitable cases the treatment by intra-laryngeal operation which he had first proposed in 1886. In reply, I urged in the concluding chapter of "Collective Investigation" some of the objections which seemed to me obvious against adopting intra-laryngeal instrumentation as a suitable means of combating laryngeal cancer. About the same time Mr. H. T. Butlin inaugurated a new era in the treatment of intrinsic cancer of the larynx by showing that owing to our diagnostic progress it was possible to obtain the same results in early cases by thyrotomy, which had previously been believed to be unobtainable by anything short of hemilaryngectomy.

tomy. From this time onward the remarkable cleavage took place which characterizes our present situation. \* \* \* \* \*

In 1900 Dr. John Mackenzie read at the meeting of the American Laryngological Association a paper entitled "A Plea for the Early Naked Eye Diagnosis and Removal of the Entire Organ, with a Neighboring Area of Possible Lymphatic Infection in Cancer of the Larynx." The contentions of this remarkable paper, with but few exceptions, run straight against all established teaching. In the course of his observations he emphatically condemns thyrotomy, and his teaching culminates in the statement that there was only one rational method, in the majority of cases at least, of dealing with cancer of the larynx: "Early extirpation of the entire organ with its tributary lymphatics and glands, *whether the latter be apparently diseased or not*, is the only possible safeguard against local recurrence or metastasis." \* \* \* \* \*

Your invitation to investigate the correctness of Dr. Mackenzie's contentions and to try to bring about a more satisfactory state of affairs was extremely welcome to me, and I will do my best to do justice to the task. I shall content myself with discussing the four most important of Dr. Mackenzie's assertions only. These are the following:

1. That the naked-eye method of diagnosis is a comparatively neglected method.
2. That the microscopical examination of a fragment intra-laryngeally removed is to be totally rejected.
3. That early extirpation of the entire organ with its tributary lymphatics and glands, whether the latter be apparently diseased or not, is the only possible safeguard against local recurrence or metastasis.
4. That thyrotomy is not up-to-date surgery, is in direct defiance of the rules that should govern us in the treatment of laryngeal cancer, and is a reversion to and a resurrection of a method of procedure that was discredited and abandoned half a century ago.

1. According to Dr. Mackenzie, the naked-eye diagnosis is a comparatively neglected method. What is the real state of this question? In the introduction I have referred to my endeavors to promote the knowledge of the subjective signs and laryngoscopic appearance of the early stages of malignant disease of the larynx. Having in 1886 and 1888 enumerated in two communications of mine some of these signs, I reverted to the subject at greater length in the "Collective Investigation" I undertook in 1888, and devoted an entire chapter of my report to a systematic description of the minute details which in a number of cases had enabled me to diagnose laryngeal

cancer at a comparatively early period. This description has, so far as I know, remained the last word on the subject. When I returned eight years afterward to this question, I stated even more emphatically than I had done in 1888, verbatim, as follows: "Unfortunately, with the only exception of those cases in which it is possible to intra-laryngeally remove a fragment of the new growth and to establish its epitheliomatous nature by the help of the microscope, *not one single sign* in the early stages of malignant neoplasm of the larynx is in itself so characteristic that it establishes with absolute certainty the malignant nature of the formation. The contour, the seat, the condition of the surface, the color of the new growth itself, the condition of the neighborhood, the mobility of the vocal cord, the age of the patient, other subjective symptoms, they all may and will assist the experienced eye in making the diagnosis, particularly when several of them *jointly* raise such suspicion, but all of them are not *absolutely* characteristic in the early stages, and the possibility of a mistake is not excluded in some less characteristic cases."

Butlin, too, has correctly characterized the situation when he said in his introductory paper on the occasion of a discussion on the early radical treatment of laryngeal cancer, that, "we were still in this position, and were likely to remain in it for a good many years to come, that we must admit that there are three classes of cases; the first in which any one and every one can make the diagnosis; the second, in which the better instructed or more experienced make it, and others do not; and the third class, in which the conditions are so obscure that no one can make the diagnosis, unless the larynx is opened, and in some of which it is even then difficult to be sure of the nature of the disease." The fact has been noted by others as well as by myself, that when an error in diagnosis is committed it is more commonly on the side of regarding an innocent growth as a malignant, than a malignant growth as an innocent one. I only wish to state that I maintain most strongly that our clinical knowledge of these cases is not yet perfect and that occasional diagnostic mistakes are unavoidable. Dr. Mackenzie himself admits that "there is unfortunately no solitary unequivocal symptom or laryngoscopic sign of cancer," and seems to allow that "after weighing carefully all the facts of the case in our possession a reasonable doubt may remain as to the diagnosis."

2. Here we come to the second of his contentions—viz., to the total rejection of the microscope as a diagnostic help in cases of intra-laryngeal growth. His reasons for opposing intra-laryngeal removal of a piece for microscopic examinations are that such removal "subjects the patient at once to the dangers of auto-infection at the

point of incision and to metastasis elsewhere, that it stimulates the local growth of cancer, and that the method is often inconclusive, misleading, and sometimes practically impossible." The first of these statements he supports in the next sentences, by saying that "the moment the continuity of a growth is broken, in that very moment the pathway is opened for self-poisoning," and that cancer being an infectious process "incision through the cancerous mass opens up at once a broad avenue for auto-inoculation." I need not say that the second of these statements is in no sense a proof of the first; it is merely a repetition in other words. The occurrence of auto-infection in cancer of the larynx is an event of the greatest possible rarity. There are, so far as I know, only three authenticated cases of this kind on record (citation of three cases. In regard to the isolated growth on the left vocal cord of the last case Dr. Semon at the time replied to the query as to whether it was due to contact or to metastasis). "Infection by contact is a question *sub judice*, and it is difficult by clinical observation only—as in so many other cases—to arrive at any indisputable conclusion; the direct proof must be delegated to experience. There is no theoretical reason, however, why contact-carcinoma should not occur where the surface opposite to the primary growth is excoriated or ulcerated, as might arise from its contact with decomposing cancerous discharge; for as the secondary glandular growths in carcinoma arise from the direct transference of elements from the primary tumor, there seems no reason why the direct implantation of infective epithelium to a granulating surface might not lead to the growth of a second tumor as well, seeing also that the grafting of a normal epidermis is so readily effected on a similar surface. That cancer might be communicated to an intact epithelial surface is also conceivable, though in either case it might be held in argument that the spot opposite to the primary tumor was prepared only by the ensuing inflammation to become cancerous, for the same general reason which lay at the bottom of the original disease." What is quite beyond dispute is that not one single case exists in laryngological literature in which local auto-infection has been described as having been due to intra-laryngeal interference. Seeing the enormous number of cases in which during the last forty years fragments of growth have been intra-laryngeally removed for purposes of microscopic examination, this one fact suffices for me, and I think will suffice for most men of a practical turn of mind, to dismiss Dr. Mackenzie's alarming assertion as too theoretical to come within the range of practical politics. Exactly the same applies with regard to the next theoretical danger with which he threatens us—that probatory

intra-laryngeal removal of a fragment subjects the patient to metastasis elsewhere. I have just had the privilege of looking through the manuscript of a monograph on intra-laryngeal cancer from the pen of Mr. R. W. de Santi, which will soon be published, and from which the author has allowed me to quote the following fact. He has been able to collect altogether hardly 20 cases in the whole laryngological literature in which dissemination by means of the circulation has taken place. Considering that already at the time of the "Collective Investigation," that is to say, in 1888, no less than 1550 cases of malignant disease of the cancer were on record, the total number of cases reported at present must be, at the most modest computation between 3000 and 4000, very likely more than that. Yet in less than 1 per cent of all these cases has dissemination been observed. From Mr. de Santi's collection, however, it is incontestable that in the few cases of dissemination that have ever been reported the abdominal viscera were fully twice as often affected as the lungs. In view of these actual facts I refuse to be frightened by the two first of the possible contingencies dealing with "metastasis elsewhere" with which Dr. Mackenzie threatens us. I can hardly imagine it possible that nowadays one single laryngologist should when meeting with a suspicious laryngeal growth pounce at once upon removal of a piece for microscopic examination, and should when this examination had corroborated his clinical fears fold his hands in his lap and tell his patient with a regretful shrug that there could unfortunately be no doubt that he suffered from cancer and that the little intra-laryngeal operation meant "the beginning of the end." The whole question in fact is whether the practical advantage to be gained is outweighed or not by the theoretical dangers to which the intra-laryngeal operation exposes the patient. Seeing the help that the microscope has so often given me in difficult cases of this kind I personally have no hesitation in following my great teacher's—the late Professor Traube's—principle that when one is confronted with two evils one ought to select the smaller. In other words, I am absolutely in favor of microscopical examination whenever this is possible.

But Dr. Mackenzie says, thirdly, that "the method is often inconclusive, misleading, and sometimes practically impossible." What I particularly object to in his statement is the use of the word *often*. That *occasionally* microscopic examination of an intra-laryngeally removed fragment might be inconclusive and misleading is, of course, known to every laryngologist in the world. That in some cases it is practically impossible to remove a piece for microscopic examination must also be freely admitted. But is a valuable method

to be altogether rejected because in some cases it is inconclusive and misleading and because in others it cannot be employed?

Referring to the question of mistakes in diagnosis, Dr. Semon quoted from "Collective Investigation" a summary of conclusions: "Microscopic investigation of intra-laryngeally removed fragments in cases of doubtful laryngeal neoplasms is a valuable but not infallible help to clinical diagnosis. It ought to be used in all cases in which it is possible. This is by no means always the case, inasmuch as in cases of sub-mucous infiltrating cancer, intra-laryngeal removal of fragments is impossible. If such removal is available, one ought never to forget: 1. That it is by no means certain that the examination may at all yield results characteristic of any definite form of tumor. 2. That even when the examination yields apparently characteristic results the possibility must be kept in view that we have to do with a mixed form of new growth. This is particularly important in cases in which the tumor is clinically suspicious and in which the microscope apparently proves its benignancy. But the reverse is also possible, as shown by a case of Schmiegelow's. It will therefore, be always desirable to transfer the microscopic examination, if it be possible, to an expert pathologist. The pathologist, however, can only give an opinion on the fragment submitted to him, and not on the disease itself from which the patient suffers, except when he finds in this fragment *positive* characteristics of malignant new growth. Examination must not be limited to the investigation of one single section, but must be extended over the whole fragment, which accordingly has to be cut up into sections, unless already previously the diagnosis of malignancy can be established with certainty. If necessary cautious intra-laryngeal removal and microscopic examination of fragments of suspected growth must be repeated several times, unless *meanwhile clinical symptoms which are incompatible with our present knowledge of the symptomatology of benign growths establish with certainty the malignant character of the suspected growth*. In such cases radical operation, if otherwise indicated, is *not* to be postponed until the diagnosis has been confirmed by the microscope.

As to the methods which Dr. Mackenzie proposes to substitute for the aid of the microscope, viz., exploratory thyrotomy, I have not a word to say against it so long as its use is restricted to cases which really demand it, i. e., to cases in which clinical experience leaves the nature of a suspicious case doubtful, in which microscopic examination is either impossible or inconclusive, and in which the conditions of the individual case make it imperative to arrive without delay at a diagnosis. But speaking from large experience I can truthfully say

that it is only in a minority of cases that exploratory thyrotomy is indicated. In addition it must not be forgotten that no guarantee can be given that some impairment of voice might not result from thyrotomy. With this I leave the diagnostic side of Dr. Mackenzie's proposals and come to his therapeutic suggestions.

3. The first of these is that total early extirpation of the entire organ with its tributary lymphatics and glands—whether the latter be apparently diseased or not—should be performed as the only possible safeguard against local recurrence or metastasis in practically all cases of malignant disease of the larynx as soon as the diagnosis has been established. This recommendation is based upon the author's contention that the severity of surgical interference, when dealing with cancer, ought to be the same in whatever part of the body a malignant growth may be met with. This contention shows a profound disregard of practical experience. The larynx with regard to this question occupies a very peculiar position indeed. Exactly 25 years ago the late Professor Krishaber of Paris proposed to divide malignant growths of the larynx into two categories, "intrinsic" and "extrinsic" forms. In the former are included tumors originating from the vocal cords, the ventricles of Morgagni, the ventricular bands, and the subglottic cavity within the borders of the larynx proper. The term "extrinsic" is applied to tumors originating from the epiglottis, the posterior surface of the cricoid plate, the aryteno-epiglottic folds, and the inter-arytenoid fold. This classification is much more than one of mere convenience. It signalizes a fact of the greatest possible clinical importance and one which has been confirmed by a quarter of a century's clinical observation, *viz.*, that in the intrinsic variety the disease remains for a long time a purely local affection and shows only at a comparatively late period a tendency to metastasis; whilst in the extrinsic variety, owing to different conditions of lymphatic anastomosis, the neighboring glands are already affected at a very early period, and indeed are usually found to be invaded when the patient first comes under observation. There is nothing mysterious or inexplicable about this remarkable difference; it simply depends upon the fact that the lymphatics of the region which constitutes the intrinsic variety form much more a network of their own and anastomose much less freely with those of the neighborhood than those which supply the upper parts and external parts of the larynx. In all circumstances, however, the broad clinical fact is certain—that cancer occurring in the intrinsic region remains much longer a purely local disease, and is therefore amenable to less severe radical treatment than the same form of malignant disease when originating in the extrinsic region.

I am extremely gratified that with regard to the all-important question just discussed I find myself in harmony with the leading authority concerning total extirpation of the larynx, Professor Gluck, who in his latest contribution to the question expresses himself verbatim as follows: "If the anatomical character of the tumor, be it medullary carcinoma or scirrhus, is not without importance for the extent of the operation, the topographical relations according to the anatomical seat of the new growth are especially decisive. In particular, if we consider the region of the neck, every surgeon will nowadays admit that we can obtain in cases of circumscribed cancers—for instance of the vocal cords which have been diagnosed in time—lasting results by conservative excisions performed in a healthy neighborhood. In the case of the pharynx and pharyngeal parts of the cesophagus the conditions are quite different owing to the lymphatic supply. (After condition of patients who have submitted to total laryngectomy described quite at length.) Yet gentlemen with all this I do not wish it to be understood that I am an opponent of total laryngectomy. Far from it. Quite apart from the fact that I should consider it absolutely unpardonable to force my own opinions upon my patients because they happen to differ in their views as to the value of life from my own, there are circumstances in which I should be most anxious to assist them in prolonging their life, however sad the after-existence may be. I have the greatest admiration for the heroism of a man who fully conscious of what will be his lot in the event of a successful termination of the operation, yet wishes to prolong his life for the sake of those dear to him. But one thing is absolutely certain, i. e., that such grave operations ought to be undertaken only under two conditions: 1. That the diagnosis was absolutely certain; and 2. In the event of there being no possibility of saving the patient by a less mutilating operation.

Four methods here come under consideration: Intra-laryngeal removal, sub-hyoid pharyngectomy, thyrotomy, and hemi-laryngectomy. With regard to the intra-laryngeal method, I have unfortunately had to differ on so many points with Dr. Mackenzie that it gives me genuine pleasure to say that at any rate I am at one with him when he says that "operation for intra-laryngeal cancer through the mouth, done almost universally today, it seems to me, should no longer come within the range of serious consideration." I reject intra-laryngeal operations in case of cancer—which by the way I believe to be not nearly so universally practiced as Dr. Mackenzie assumes—not because I deny the possibility of curing a few patients by this method, but because in my opinion the game is not worth the

candle. The second contingency—sub-hyoid pharyngectomy—can be dismissed in a very few words. In malignant disease of the larynx it is only applicable in cases in which the disease is confined to the epiglottis, or to the aryteno-epiglottic folds, and in which the neighboring lymphatics have not yet been infected.

4. But how about thyrotomy? Here we come to the last and perhaps the most extraordinary of Dr. Mackenzie's assertions. As already stated, he unreservedly condemns this operation in the following terms: "Thyrotomy with curettement or removal of all apparent (visible) parts diseased is not up-to-date surgery, is in direct defiance of the rules that should govern us in the treatment of cancer, and is a reversion to and a resurrection of a method of procedure that was discredited and abandoned half a century ago." One thing, appears to me quite certain, and that is that if an author not merely completely disregards the practical experience of trustworthy members of his own profession and sweepingly condemns their procedures, but additionally flatly contradicts himself, he is bound to give reasons for his sudden change of front, instead of mere assertions, expressed in a manner which he must have foreseen could not but hurt the feelings of those who had obtained the most satisfactory results by the method which he so unconditionally condemns. But, incredible as it may seem, no reasons whatever are adduced in his paper for the attitude assumed and the suggestions which he made in the discussion of 1902, viz., that "in considering apparent cures from this, as well as other incomplete and therefore hazardous and unsurgical operations, two mighty possibilities should be forever borne in mind; mistakes in diagnosis and the simple accident of good fortune," are again not in the nature of proofs but of further assertions and can but add fuel to the flames. I know that Dr. Mackenzie is absolutely incapable of deliberately making a misleading statement, but in speaking of thyrotomy as not being up-to-date surgery, as being in direct defiance of the rules that should govern us in the treatment of cancer, and being a reversion to and a resurrection of a method of procedure that was discredited and abandoned over half a century ago—he none the less creates as wrong an impression in the mind of the uninitiated reader as if he had intended to produce it.

The advocates of thyrotomy take their stand on the basis of the same celebrated dictum of Virchow's, which Professor Gluck has quoted as his guiding star: "If cancer be at its commencement and often for a long time a purely local disease, it must be possible to cure it during that period by local treatment." Clinical experience has conclusively proved that intrinsic cancer of the larynx is prominent among those forms of malignant disease in which the disease

not merely commences as a purely local affection, but remains, as a rule, for a comparatively long time limited to its original focus. If during that period its true nature be recognized, and an operation be performed, which not merely removes the tumor itself, but a sufficient area of healthy tissue in all directions around it, the patient has a reasonable chance of being lastingly cured. Such an operation is modern thyrotomy as first suggested by Mr. Butlin. Fifteen years' experience has shown that by its employment the disease can be completely and lastingly eradicated, and to describe it as an "incomplete and therefore hazardous and unsurgical" operation is wide of the mark. Surely Dr. Mackenzie himself cannot seriously believe that not only Butlin and myself, but the whole British school of laryngologists, and additionally Chiari, Schmiegelow, and Moure should for fifteen years have been persistently favored by the "simple accident of good fortune." But whatever the meaning of his curious explanations may be, I think I may assure you that no such wholesale mistakes as those alleged by him have been committed, and as a proof thereof I beg to submit to you the microscopic preparations of 18 cases of my own, in 15 of which I performed thyrotomy, and in one case hemi-laryngectomy, whilst in the two remaining cases the operations were successfully performed by my friend and former assistant, Mr. Evan C. Stabb. These slides I trust are sufficiently representative to convince anybody who does not deliberately shut his eyes to plain facts that my operations have not been performed on the basis of a mistaken diagnosis.

And now, as to the results of the operation so much depreciated by Dr. Mackenzie. Last year at Swansea I reported from my own practice 20 thyrotomies, with or without removal of small fragments of cartilage in cases of undoubtedly malignant disease of the larynx, with 19 recoveries, 2 quite doubtful recurrences, and 1 death. As I am firmly convinced that no recurrence need be feared if the patient has remained well for a full year after the operation, I am now—irrespective of the incomplete operation which had to be repeated—in possession of a material of 20 thyrotomies performed for undoubted disease of the larynx, between 1891 and 1904, with 1 death, 2 doubtful recurrences, and 17 lasting cures, bringing the percentage of successful cases in my own practice within that period up to 85 per cent. In this connection it deserves particularly to be mentioned that the great majority of cases have regained a surprisingly good, though of course more or less husky voice, and that in a few cases only have their vocal powers been reduced to a whisper. My oldest successful thyrotomy dates back to June 2, 1891, more than thirteen years ago,

and I have other patients living and in good health upon whom the operation was performed 12, 10, and 9 years ago.

It appears to me that Professor Cisneros treats those cases which I would treat by thyrotomy by means of the intra-laryngeal method, and performs thyrotomy where I, in the majority of cases would probably perform hemi-laryngectomy. For when a vocal cord is completely fixed—this, I think, is what he means by speaking of “complete paralysis”—the presumption seems justified that the infiltration had already extended very deeply. Want of success of simple thyrotomy when performed under such circumstances is not surprising. Permit me, therefore, earnestly to repeat my advice that thyrotomy should be performed only when the new growth is still limited to the intrinsic region of the larynx, is still circumscribed, is not too extensive, and does not infiltrate too deeply, and that in such circumstances a sufficient zone of healthy tissue should be included in the area to be removed *everywhere* at a sufficient distance from the new growth. Should it be found in the course of operation in a case which seemed on laryngoscopic examination to fall under this category, that the disease is more extensive than had been presumed from laryngoscopic appearances, the operator must not hesitate to extend his operation into hemi-laryngectomy, or, if both sides of the larynx should be involved, into total extirpation. It is only by the observance of this cardinal rule that thyrotomy will gain the place which is due to it amongst radical operations for cancer of the larynx. I may be permitted here, speaking before an American audience, strongly to repeat a former recommendation of mine, i. e., that only chloroform, not ether, should be employed in these operations. Their one real danger lies in complications on the part of the respiratory organs, and every irritation of these parts should therefore be strictly avoided. That it is the tendency of ether to produce such irritation is known to everybody.

The only remaining operation to be discussed is a hemi-laryngectomy, or partial extirpation of the larynx. Already, last year, I expressed my conviction that partial extirpation of the larynx will come to be more rarely performed in proportion to the diagnosis being arrived at more and more early, when thyrotomy will not suffice. It should, in fact, only be employed when the disease is found to be too advanced and too deeply infiltrating to be eradicated by thyrotomy with removal of soft parts only. That in such circumstances its results are not likely to be so satisfactory as thyrotomy in early stages is obvious; the disease having been so much longer in existence there is reason to fear that it may no longer be purely

local and that metastasis may already have occurred. My own experience, limited to four laryngectomies, bears out that consideration.

And now, gentlemen, I am at the end of my task. I have, as I promised, nailed my colors to the mast of practical experience as against theoretical possibilities. At the same time I trust that I have succeeded in showing you that the principles upon which my views are based are not purely empirical, and are in all points in concord equally with the experiences of practice and with the achievements of science. Let me summarize what I have endeavored to establish under the form of the following theses, which may serve as a basis for the discussion which I understand is to follow the reading of this address.

1. It is of the greatest importance that the diagnosis of laryngeal cancer be made at the earliest possible moment. For this purpose it is most essential that the still prevailing notion, viz., that malignant disease is from the first attended by all sorts of grave constitutional symptoms—be completely eradicated, and that the attention of the general practitioner should again and again be drawn to the fact that there are no more promising cases for radical operation than those in which the disease is at first manifested by nothing else than by obstinate hoarseness, occurring, without any apparent cause, in middle-aged and elderly persons.

2. Clinical diagnosis arrived at from the history and subjective symptoms of the case, from laryngoscopic examination, from accessory circumstances of importance, such as the patient's age, etc., has reached a certain degree of perfection, and enables us in a good many cases to make a correct diagnosis at an early stage of the disease; it is, however, by no means absolutely perfect, and occasional mistakes occur even in the practice of those most experienced.

3. In these circumstances clinical diagnosis ought, whenever possible, to be confirmed before radical operation of any kind is undertaken, by the intra-laryngeal removal and microscopic examination of a fragment or fragments of the new growth. This, however, should only be done if the patient previously consents to immediate radical operation being undertaken in the event of the microscope confirming the clinical diagnosis. Should this be the case the practitioner's position will have been materially strengthened. The microscope, however, is by no means infallible in these cases. Should evidence be negative or inconclusive, the intra-laryngeal removal and microscopic examination of fragments should either be re-

peated—if necessary several times—or, if the clinical symptoms do not warrant postponement, exploratory thyrotomy should be undertaken.

4. The intra-laryngeal method is from its very nature unsuitable for the radical removal of malignant new growths of the larynx.

5. Sub-hyoid pharyngotomy, apart from being applicable in a very small number of cases only of malignant diseases of the larynx, is still *sub judice* with regard to its advisability in such cases.

6. Thyrotomy, if undertaken in suitable cases, and at a sufficiently early period, and if performed on the modern lines which experience has shown to be successful, is a perfectly ideal operation in intrinsic cancer of the larynx.

7. Hemi-laryngectomy comes into question only when it is found after opening the larynx that mere thyrotomy will not suffice. When performed it may be accompanied by removal of the tributary lymphatics, even if apparently not diseased.

8. Total laryngectomy should be exclusively reserved for extrinsic, and for those cases of intrinsic, cancer in which both sides of the organ are affected, and in which the disease has proceeded too far to be eradicated by milder measures. When performed, it should be accompanied by the removal of the laryngeal lymphatics on both sides of the neck.

If the adoption of these principles should meet with your approval, gentlemen, there will be an end to the deplorable schism which has of late separated the surgeons and laryngologists of various countries, with respect to the diagnosis and treatment of malignant diseases of the larynx, and we may justly hope that in striving shoulder to shoulder we shall advance science and benefit our patients.

#### DISCUSSION.

Dr. FRANK HARTLEY opened the discussion by saying: I have little to add to such a masterful paper, but I think that anyone who has had experience in this disease will have some points of interest to others. I have operated upon twelve cases of malignant disease of the larynx. Five of these cases have been operated upon by thyrotomy. In these operations the tumor has been removed by the knife or scissors. The hemorrhage has been stopped by the cautery and the patients have all recovered. There are no recurrences so far as I know today. The most recent case is one year old. The oldest is about eight years old.

I have not been so much interested, however, in the early intrinsic cancer of the larynx as I have been in those which have had an

accompanying glandular involvement, I have had seven of these cases. Three of them have been hemi-laryngectomies. Four have been complete laryngectomies. Of the hemi-laryngectomies, one is still alive and two have had recurrences. Of the complete laryngectomies, two are living; one after four years and one after three years. One case recurred within six months. One died on the third day after operation from an aspiration pneumonia. The point which has interested most is the fact that in those cases which recovered, either complete or partial laryngectomies, the enlarged glands were those which are seen in the superior carotid triangle of the neck, namely, those glands referred to by Most, as situated on the posterior border of the thyro-hyoid muscle and at the attachment of posterior belly of the digastric muscle to the hyoid bone.

When these glands are alone involved and are not adherent to the surrounding tissues I think that even if both sides are involved a satisfactory result can be obtained. This naturally holds good for malignant disease situated in the anterior portion of the supra-glottic space. When the disease is confined to the posterior portion of the supra-glottic space or to any part of the sub-glottic space the lymphatic supply is so far that early infection of the peri-tracheal and deep carotid glands occurs and recurrence after removal takes place within six months. In such cases I content myself with tracheotomy. In every case where I have operated, the condition of the lymphatics has been carefully noted. For prognosis, the condition of the lymphatics is very important. If the glands above spoken of as located in the superior carotid triangle are alone involved we can offer a prognosis of possible cure in 40% to 45%, and of recurrence in 40% to 45%.

This is a better prognosis than we were able to give some years ago. Another point of great interest is the importance of an incision upon both sides of the neck for exposure of the lymphatic glands even if a hemi-laryngectomy is done. In one of the hemi-laryngectomies recurrence took place in the glands of the opposite side of the neck. To obtain the best results, a total laryngectomy with such an exposure as will bring to view everything in the neck down to and below the cricoid cartilage is required. This pertains alone to growth situated above the vocal cords or on the anterior portion of the supra-glottic space. If, however, the tumor is situated in the posterior portion of the larynx or in the sub-glottic space, the diagnosis must be made at the earliest possible moment to avoid the early lymphatic involvement and consequent contraindication to operation.

Another interesting point is the question of preliminary tracheotomy. The one case of death in my twelve cases was where I did not insist upon it. Where laryngeal stenosis exists, this should be done several days before the operation. By the admission of air to the lungs the congestion and increased secretion of the tracheal and bronchial mucous membrane will be diminished and through the oxygenation of the blood, the heart action may become better and the patient will be placed in a far more satisfactory condition for operation. Not only that, but the administration of the chloroform will be easier. I feel absolutely certain that my statistics would be free from death following operation had I insisted upon this point. I believe, moreover, that this preliminary tracheotomy is a most potent feature in preventing an aspiration pneumonia. I believe that this pneumonia can be entirely prevented by attention to three points. 1. Division of the trachea and suture to the skin (Glück). 2. Absolute closure of the pharynx from the hyoid bone to the cesophagus, so that no secretion can escape into trachea. 3. Preliminary tracheotomy where laryngeal stenosis exists. Death due to aspiration pneumonia I think is brought about by a neglect or an inability to enforce these measures.

The next point of interest is the question of how much effect is to be expected from the cutting of the superior laryngeal nerve. I must say that in every case, observation has been made and no effect has been noted, either upon the respiration or the heart when the nerves were cut. That is in seven cases we have seen no bad effects from simple division of the nerves.

The next point of interest is the question of an artificial larynx or vocal education. An artificial larynx is a very poor substitute. The voice is uncanny. The instrument is troublesome and annoying in its use. It is also said to favor recurrence. People who have had complete laryngectomy and have been taught the use of the voice, have been able to talk and be understood at considerable distances. They have expressed themselves as well satisfied, especially those in whom the epiglottis has been saved. Here voice is higher toned than when it has been sacrificed. The operation of thyrotomy and the removal of the growth before lymphatic involvement is present (Butlin, Semon, Koches) is the ideal operation. The good results are due to the early diagnosis and the slight but sufficient operative procedure.

There is no operation so far suggested which is superior to it and the statistics amply prove it. I believe there will always be a certain number of cases which will come to the surgeon when lymphatic involvement exists. These cases will require a complete

operation and the work must be thoroughly done. The future method for these cases will be the hemi-laryngectomy with bilateral glandular removal. At present I am content to believe that the best operation is the total laryngectomy.

Dr. J. A. BODINE. I scarcely feel that my experience in the surgical field of malignant disease of the larynx fits me to discuss this paper. I desire, however, to thank our guest for what he has taught us tonight in this department of surgery in which he is a master.

My experience is limited in total laryngectomy to three cases. I believe that I was the second man in this country to do a complete laryngectomy, with the after development of the pharyngeal voice. The first case that I had was a patient in whom Dr. Myles was interested. The larynx was entirely removed, the man recovered, and developed a whispering voice which could be heard distinctly at a distance of thirty feet. He lived for over two years, and died from recurrence of the growth in his stomach. The second case of complete laryngectomy was that of a man who lived for five months and died of pneumonia. In the third case of complete laryngectomy, part of the oesophagus was removed, and the man died in twenty-four hours from shock.

In looking over the statistics of our guest which he has published and those which he has presented again tonight, it seemed incomprehensible how he could cure so large a proportion of cancers by a local enucleation. We cannot make a local enucleation of a skin cancer anywhere on the body with anything like so successful a result as Sir Felix reports, but after studying his article very carefully this afternoon I perceive that there is a difference in our use of terms. I have always thought of intra-laryngeal cancer and extra-laryngeal cancer as inside and outside, but his definition of intrinsic cancer is one limited on or between the vocal cords, and extrinsic cancer is one involving the arytenoids epiglottis or epiglottic folds or any other intra-laryngeal structure excepting cords and the intervening space. If you stop and think a moment of this part of the anatomy you will see that this is not a very vascular area. It has very few follicles, and fewer lymphatics. A cancer here is lazy in growth, circumscribed and slow to spread by infiltration, and I believe now that our guest is correct in advocating local removal when the cancer is inside of that area—that he terms intrinsic.

What particularly interests me are some little points in the practical technique of the removal of the larynx which have developed in my experience, and the first is that of preliminary tracheotomy, which is not necessary as a feature in the complete removal of the larynx; the second point is the control of the hemorrhage, and here

I want to emphasize a point which has been of great practical value to me. If, when you make your incision over the larynx and connect either end with a horizontal incision reaching to the sternomastoids, these muscles can be retracted and the external carotids exposed. This artery is to be found always easier and quicker than the two superior thyroids. An aneurysm needle threaded with a piece of rubber band such as is used to confine letter packages is passed around the vessel when these are made taut in the hands of an assistant the entire operation can be completed without hemorrhage. After you have completed, remove the band and the vessel is uninjured. Decide where to cut the trachea and at this point separate this tube from the esophagus and slip a bistoury behind the trachea dividing it at one stroke of the knife. Not a drop of blood will go into the larynx or lungs if the lung end be quickly pulled out of the wound, and there is no interruption to the breathing or anaesthesia.

I agree with Dr. Hartley that the incision should be sewed up completely. If you will sew the pharynx to the base of the tongue and complete the closure of the wound, you will eliminate the greatest cause of septic pneumonia. During the convalescent period, the patient should be kept in the inverted Trendelenberg position, which relieves the diaphragm of the pressure of the superimposed viscera in the thorax and makes breathing easier.

Dr. BREWER. I also wish to add my thanks to those of the other speakers—both to Sir Felix and the members of the association, for giving us an opportunity to hear this exceedingly interesting and attractive paper from one who is a master in this line of work. It is a gratification to come personally into contact with him and to hear this paper from his own lips, for he is a pioneer in this line of work and has added more to our knowledge of it than any other living man. The paper is particularly interesting to me, for while I was moderately familiar with his earlier work on the subject, I was not aware that his later work had been so successful. I think we are all impressed with the great simplicity of this method of treating intrinsic cancer of the larynx. It seems strange that in this particular situation the treatment of cancer can be different from that in any other part of the body. In other parts we seek to remove the tissues as far as possible from the point of original growth, but apparently here it is by the minor operation that the best results have been obtained. But the reason is apparent when we refer to the anatomy of that region to which he limits this operation.

We have the line of the vocal cords, and that limited area of mucous membrane above it which is scantily supplied with lym-

phatics. Attempts that have been made to inject the lymphatics here are generally unsuccessful. If we go above or below this point, the lymphatics are more abundant, increasing with the thickness of the mucous membrane, and it is due to this fact, and the fact that the great majority of cases of epithelioma occur in or near this region, that metastasis occurs late and that this treatment is successful.

Early diagnosis is essential to the recognition of such a growth and the possibility of a complete cure, and in order to reach this we must use the utmost possible care. The original lesion may be simply an indurated patch, it may be a papilloma which resembles a benign growth, or it may be an ulcerated area which resembles early syphilitic or tuberculous disease. The only way to determine this is to remove a piece by the intra-laryngeal method or perform a thyrotomy.

When we consider that a great majority of these growths occur in people over forty years of age—any suspicious hoarseness occurring in a man of that age without cough should be regarded as a possible early symptom of carcinoma. Again, if with a given lesion we have around its base an area of congestion, edema, or infiltration, or should see diminished mobility of the vocal cord suspicion should be excited, and although we can make no accurate diagnosis, we should make a microscopic examination, or proceed to remove by thyrotomy such a lesion limited to the vocal cord.

I believe that in these cases thyrotomy and the removal of the growth through the thyrotomy incision is the operation of choice, and that that is the best method of treatment. If, however, he have an ulceration of the cartilage, I believe that the operation of choice would be a total laryngectomy. In the eight cases of malignant disease of the larynx four were operated by thyrotomy and four by total laryngectomy. Of the former one is dead, the other three are still living—one of them, however, being too recent to form any definite idea of the result.

Of the laryngectomies, two died as a result of the operation, another died from pneumonia after recovery from the operation and one is still living and perfectly well,  $4\frac{3}{4}$  years after the operation.

One or two points in regard to the-operative technique: In laryngectomy I invariably dissect out the lymphatics along the superior thyroid vessels—remove them with the vessels and surrounding alveolar tissue and divide both superior laryngeal nerves. By the latter procedure we limit to a very considerable extent the amount of operative shock.

One other point which I have found useful in the operation of laryngectomy is the use of cocaine and adrenalin on the mucous mem-

brane. This gives not only hemostasis, but also enables us to so blanch the tissues that we get an accurate outline of the growth, and thus feel more sure of its limits than in the ordinary congested state.

Dr. DELAVAN. Nothing could interest us more greatly than the paper to which we have listened this evening. I have looked forward to its reading with unusual satisfaction because, for many years, I have followed the work of Sir Felix Semon and Mr. Butlin and hold in highest appreciation the splendid success which they have attained, work in which they have been practically pioneers and have taught lessons of greatest value to the whole surgical world.

The subject of cancer of the larynx in general is a wide one and even trying to consider the many topics brought forward by the reader of the paper more time would be consumed than is at my command. I will therefore attempt to discuss certain points, leaving the rest to others.

And first, with regard to the removal of parts of an intra-laryngeal new growth for the purposes of microscopical examination and diagnosis. With the statement that such tissue may be removed indiscriminately and that objection to procedure of this kind is based upon grounds purely theoretical it is necessary to take only positive issue. No clinical fact has been more commonly observed nor is more generally accepted than the one which relates to the irritation of incipient epitheliomatous growths. Wherever found in the body, the universal testimony is to the effect that the less the growth is disturbed the better; conversely, irritation of a growth is apt to be a marked stimulus to its progress. This phenomenon is such common observation that no one can question it. In my own experience I have frequently seen irritation of an intra-laryngeal growth followed by rapid advancement of the disease. I was therefore prepared to combat the views advanced by the reader of the paper until the proposition was offered by him that, while it was very desirable that tissue should be removed for microscopical examination and thus an accurate diagnosis established as early as possible in the history of the case, yet before such removal of tissue the patient should be warned of the possibilities and in case the microscopical findings should prove cancer to be present, he should submit himself at the earliest possible moment to an operation for its radical removal.

This position, I have taken for years. It is the one held by the gentleman whose views have been called in question and I believe it to be entirely logical, scientific and wise. If the reader of the paper had made this simple proposition at the outset, there would have been little occasion to say more upon the subject, as no one would think of controverting it. With regard to the reliability of the micro-

scopical finding, infallibility certainly cannot be claimed for them, and whether mistakes arise "often" or only "occasionally" must be determined upon by the experience of the individual observer or upon his interpretation of the meaning of foregoing words. The result of microscopical examination is certainly misleading even under the best conditions, and a positive diagnosis cannot always be thus made, for reasons well known to all conversant with such things. Too great reliance, therefore, should not be placed upon it unless the signs of disease are sufficiently definite.

The gross diagnostic signs familiar in most epitheliomas of the larynx are not by any means always present. One to which I long ago called attention and have frequently observed is the characteristic lancinating pain of early epithelioma often observed in the larynx as well as in other parts of the body. By "lancinating pain" I do not mean the pain which radiates into the ears late in the history of a pharyngeal growth when ulceration is taking place—a pain which is simply reflex in character and totally different from the one in mind.

While in some cases the diagnosis of cancer is comparatively easy, there are many instances in which it is extremely difficult. It is particularly easy to mistake specific disease for it. If mistakes in the diagnosis of this condition were confined to the general practitioner of little experience, it would be a different matter; but the specialist is often at fault, and in some cases not even the most expert observer can possibly determine the true nature of the case. Where doubt exists as to the diagnosis, my invariable rule is to place the patient on trial doses of iodide of potassium, thus making the diagnosis by exclusion. It is surprising to find in how many cases sent for an opinion as to the propriety of the surgical removal of a supposed malignant growth a short course of anti-specific treatment will produce rapid and complete cure.

With regard to the ultimate result of complete laryngectomy the reader of the paper is somewhat pessimistic. What may have been true, of the complete operation, twenty years ago, does not by all means necessarily obtain today. Even as far back as 1884. Dr. Wm. T. Bull operated successfully upon a case of my own and the patient lived for several years afterwards in remarkably comfortable condition, finally dying of pneumonia. Dr. Frank Hartley's recent article on this subject is an able plea for aid to those patients in whom the disease has progressed beyond the limits of less radical methods of extirpation, and the successful results of his own operative work in this department are highly creditable. At present it is not very difficult to find patients thus operated upon who are leading useful

and contented lives. Even during the last ten years great improvements have been made in the surgical technique of these severe cases and changes in operative procedure adopted which have greatly minimized the subsequent discomforts and disabilities of the patient. Notably among these is the attachment of the severed end of the trachea to the margins of the incision in the neck, as practiced by Solis-Cohen and Keen and adopted by Glück, with brilliant success. The assumption that to a man deprived of his larynx life is necessarily not worth living is not borne out by experience, nor sustained by often observed facts.

With regard to the statistics given by the reader of the paper he states that it is his custom to include in them cases which have passed but one year from the date of the operation, classing such cases under the head of "permanent cures." I am convinced that the expression "permanent cure" should be used in this connection with considerable care. Beyond question, recurrence may take place long after the removal of a growth. It is therefore plain that no arbitrary limit of time can be fixed beyond which there will be an absolute certainty of permanent immunity from relapse. In point of fact, most recorded statistics of radical operations upon the larynx for cancer show that the number of patients alive at the end of one year is no criterion of the number who may have survived the second or third years after operation. One-half, and in some instances as many as two-thirds, of the patients reported alive and well at the end of the first year have died within three years. Among surgeons in general, as far as I am able to learn in studying the history of cancer in other parts of the body, three years is considered the minimum allowance of time in which to record a case as one actually cured. In comparing the statistics of different authorities, therefore, it must be understood upon what basis of time allowance the cases included have been based, since to compare statistics based on a one-year limit with statistics based upon a limit of three years would be obviously unfair.

Whatever may be said, however, with regard to this question, there is one fact which stands out in splendid prominence, and that is the substantial advance which has been made in the treatment of laryngeal cancer through the teachings of Mr. Butlin and the work of himself and the reader of the paper to which we have just listened. In the light of their results, criticism is silenced and but one sentiment can be held: namely, one of intense satisfaction that such brilliant advance has been made and such possibilities of relief secured. With full respect for those who are willing to attempt the relief of the severer cases by more radical surgical procedures, it must still

be clear to every one that with laryngeal cancer as with malignant disease in general, the earliest possible recognition of the disease and its most prompt and most thorough eradication will, in the light of our present knowledge, give by far the best results, both in the most successful eradication of the disease and in the most conservative and least mutilating effect upon the patient. The proof of this is easily gained by the actual comparison of patients, many of those who have submitted to a simple thyrotomy being left in a condition which to all intents and purposes is practically normal.

The fact that I, personally, never operate enables me to speak with more freedom upon this subject than would otherwise be the case. My urgent advice to all who deal with such cases would be: If you wish to get the best results in cases of early intrinsic cancer of the larynx, read, study carefully, the work of Mr. Butlin and of Sir Felix Semon; and by as much as you vary your operations from the strict lines of Mr. Butlin's teachings, by so much you will lessen the success of your patient's case. On the other hand, according to the strictness with which these rules are followed you will attain a greater and greater degree of gratifying success. I wish that the conviction of this fact could be forcibly carried to the mind of every surgeon. Mr. Butlin's rules are simple but they have been worked out with the utmost care and in the light of a wide and unusual experience. He has given them clearly to the world, withholding nothing; and in view of our present knowledge upon the subject, they are today the best rules that we can command. By all means, therefore, let them be received with respect and applied with all due care until better means have been suggested.

Meanwhile, let it be always remembered that the real hope of the future lies not with the surgeon but with the coming discoverer who is to teach how cancer may be cured by other means than the knife, or better still, how it may be altogether prevented.

The instrument exhibited (thyrotome) is objectionable for well known reasons. By far the best implement for dividing the thyroid cartilage, especially when ossified by disease or old age, is the electric saw, devised a dozen years ago by Clinton Wagner, of New York, one of the most experienced and successful of living operators.

The chairman then introduced Dr. J. SOLIS-COHEN, of Philadelphia, who spoke as follows:

If I have comprehended him properly your illustrious guest has purposely confined his more important remarks largely to intrinsic carcinoma of the larynx, and to thyrotomy. I can but accord with the conclusions at which he has arrived. In the first place, as to intrinsic carcinoma of the larynx:

It is important, if practicable, to get a piece of the growth out, and see whether it be malignant or not. Whether that examination result in a satisfactory diagnosis or otherwise, it is equally important, as he and others have mentioned, that this should not be done unless the patient is prepared to undergo whatever operation the surgeon may decide as most desirable. Another point is that when we operate upon the growth we almost always find it larger than it has looked in the laryngoscopic image. What is seen there is simply the edge; the bulk of growth may be several times greater, and so one can not always be certain that the simple division of the larynx and excision of the growth will be sufficient to eradicate the evil. The patient must be prepared beforehand to submit to further mutilation if requisite. Then Dr. Semon emphasizes the fact that you should remove more than the growth. This brings to my mind a case upon which I operated in 1867 by thyrotomy and excision of the growth; a patient who lived 25 years thereafter and then died of apoplexy, while doing that operation the late senior Prof. Gross who was present leaned over me and with his mouth close to my ear said:

"Cohen, take out the very atmosphere of the d—— thing."<sup>4</sup>

In that operation and in others performed later, I have followed a technique rather different from that advised by Dr. Butlin and Sir Felix Semon. I have always performed, not a preliminary, but a prophylactic tracheotomy—one that is performed several days in advance of the main operation, in order that the patient may become accustomed to breathing with a disturbed air passage. For dividing the thyroid cartilage I use a pair of cutting pliers, similar to those that have been shown, but more oblique, and without the terminal knobs, and I have never used a suture in skin perichondrium or cartilage. I prefer to rely upon the resiliency of the cartilage to take its own place, which it often will do even better than when sutured, and better results ensue too, as to voice if you avoid the suture. For the skin, I use two longitudinal pieces of adhesive plaster and fasten them along the sides of the incision, and suture the adhesive plaster leaving the wound free. This brings the parts together thoroughly. In this way, while it may perhaps not heal as well as with the English surgeons, the very best results have been obtained.

Dr. W. C. PHILLIPS told of a patient who came to him eight and a half years ago with a hoarseness of speech, upon whose vocal cord he discovered a nodular growth, which he thought at the time to be a papilloma and removed. It was examined microscopically, and reported to be an epithelioma. He then advised the man to have a com-

[<sup>4</sup> This case with a subsequent one of his own was adduced by Prof. Von Bergmann as his justification for desiring to perform thyrotomy and excision of growth in the case of the unfortunate Crown Prince of Prussia at an early stage of the disease. J. S. C.]

plete operation performed and a few days later Dr. Curtis performed a partial laryngectomy, tracheotomy having been performed some days previously. A week later the man had a septic pneumonia from which he recovered. He has a good voice, and even filled the pulpit of his church for a time. He has gone on without recurrence. I examined his larynx this morning, and while he has some little difficulty in breathing he is in fine health, has no indication of recurrence and has been for some years filling a clerical position.

Dr. DAWBARN. I wish that time served to permit me fully to express how greatly I have appreciated this paper, and have also enjoyed the discussion. I would like very much to go over some of the interesting points of technique, but most of the essential matters have been already covered and I would not rise at all if there were not two points which in my opinion are of much importance, and one of minor value, to which no allusion has been made.

First. As to the mode of examination, to which such an amount of Sir Felix's paper was devoted. If one attempts to remove from within the larynx a portion of the growth for microscopic examination, one is never sure, certainly at an early stage of the disease, of getting a reasonable amount of tissue from which the microscopist can make a satisfactory report. I would advise the use of the *freezing microtome*, after splitting the thyroid cartilage; getting the patient's consent beforehand to operate then and there if the microtome reports malignancy. You can get the necessary amount of tissue, hand it over to the waiting pathologist, and in 10 minutes he will hand back his report, and you could then decide at once as to whether or not a more extensive operation is required. Of course there are instances by the freezing microtome as by other and slower methods, where the diagnosis would still remain in doubt. This fact does not vitiate the wisdom of this course as a plan for regular adoption.

The instrument that was passed around is a good instrument for the purpose (a bone forceps, with hooked beak, for cutting the thyroid cartilage.) The patients, being most of them elderly, in a majority of cases the cartilage has undergone calcification, and an instrument that would attack bone is necessary. But better than a pair of shears in my opinion, is the Gigli wire saw, which avoids all crushing of cartilage. First a stout silk thread is passed by a very large needle, in at the cricothyroid space and out above, at the thyroid notch. This thread is now used to draw the Gigli saw into place.

Regarding a cause of death that is unfortunately far from infrequent—I refer to septic pneumonia from the entrance into the bronchi, of matter from the fluids of the mouth—in operations where we have, from a partial laryngectomy, interferences for a time with

perfect epiglottic closure of the laryngeal entrance, there is a simple expedient which takes the place of preliminary or immediate tracheotomy; namely, both during operation and for a time afterward, *lowering the patient's head*. It is a plan which I think we should all employ; and in my book, upon Treatment of Certain Forms of Malignant Disease, I described in detail two cases in which I know no one will fail to agree that neglect of my orders as to posture, after operation, was the cause of death—from a Schluckpneumonie.

These cases were ones operated upon for cancer of the tongue, leaving too short a stump to control, in swallowing, the epiglottis. The principle is of course the same as if for partial laryngectomy. The position with the bed head just low enough to prevent entrance of mouth or laryngeal fluids into the lungs by gravity, should be maintained even weeks if necessary in all such post-operative cases until either the fluids named have ceased to be infective, presumably, or else until the patient can swallow cold water *without coughing*; a simple and reliable test of perfect epiglottic closure again.

In conclusion: Sir Felix did not allude in his paper to another expedient which I presume has not, as yet, been brought to the attention of those on the other side of the Atlantic. If you have a cancer of the larynx that is so far advanced that complete excision is impossible, and if X-Ray or Finsen ray or sundry other plans have been tried uselessly, at least you may feel assured that you can grant the sufferer a few months longer life than otherwise is possible by employing the starvation plan—as detailed in the speaker's Gross Prize work. An immediate relief to pain, with rapid though temporary shrinkage of the growth, is the testimony of all who have so far tried it. When the disease is sarcoma, instead of carcinoma, we may have a reasonable hope of greater permanency, judging by cases reported by the speaker. And remembering that sarcoma spreads through the bloodvessels, chiefly, while cancer through the lymphatics, one can readily see that starvation of the growth by cutting out, after ligating the nourishing vessels would naturally be more hopeful in sarcoma. However, even in cancer it is worth while if the patient for any reason demands every possible week of life. And in no case in any region fed by the external carotid have I had sloughing of normal flesh as a consequence of the starvation plan being adopted.

It is a fact that normal tissues prove capable of life even when all named arteries feeding them are tied; and can survive with a small fraction of the blood necessary for so vascular a thing as a cancer to exist, not to mention its growing further.

SIR FELIX SEMON. Gentlemen, I have to thank you very heartily for the extremely kind reception that you have given to my paper. My only regret is that my old friend, Dr. John Mackenzie is not present to discuss it. I hoped that by a personal exchange of our opinions a partial reconciliation of our conflicting views, if not an entire agreement might be arrived at.

Those gentlemen who have taken part in the discussion this evening have none of them, so far as I can judge, expressed any views which were diametrically different from those which I submitted. I would have you note that my paper was one dealing with principles rather than with operative details. I had been told that Dr. Mackenzie's views had disturbed a good many minds on this side of the Atlantic, and that men did not dare to remove a piece of tissue for diagnostic purposes because they feared to be accused of having aggravated matters later on when in the natural course of events the patient's condition got worse. That seemed to me to be more or less a revival of the disastrous theory that there existed a special liability of benign growths of the larynx to undergo malignant degeneration when subjected to internal instrumentation and I considered it my duty to protest again such a doctrine.

My second great point was that total laryngectomy was not invariably indicated when the diagnosis of laryngeal cancer had been arrived at, and that milder measures often sufficed to effect a cure. I am glad to see that none of the gentlemen who spoke tonight have any fault to find with these two principles.

Some astonishment has been expressed at the very satisfactory results we have obtained in Great Britain. I can assure you that each of you—including those who are even now skeptical—will obtain similarly good results if you will follow the suggestions which I have made on this and previous occasions with regard to early diagnosis, if you perform the operation in suitable cases only, and, at present at any rate, without modifying Mr. Butlin's and my own procedure.

I have listened with very great interest to the observations of Dr. Hartley and Dr. Bodine on total laryngectomy. As yet I have never done a total laryngectomy. I always send these cases to my friends, the surgeons, and I only hope that the results you have obtained here may be better in the aggregate than those which I have seen. I am very glad indeed that Dr. Hartley corroborated what I said about the lymphatic supply of the different parts of the larynx.

In regard to tracheotomy, I would say that both Dr. Butlin and I do the tracheotomy first and the thyrotomy immediately afterward. In our thyrotomy cases it is not necessary to subject a patient to two

operations, such as a preliminary tracheotomy, to be followed some days afterward by the thyrotomy. The whole thing can be done at one time.

I am very glad to hear my opinion that everything depends upon an early diagnosis corroborated by such distinguished surgeons.

Dr. Bodine spoke of the differentiation of intrinsic and extrinsic cancer of the larynx. I would take the liberty of referring him to Krishaber's original definition, as given in my paper. That definition has proved most satisfactory from both the scientific and the practical points of view.

Then I was much pleased to hear from Dr. Brewer that at so many points his experience coincides with mine. I would only make one little objection to one of his statements. He wants to assign a very isolated position to intrinsic cancer of the larynx, in that it is amenable to successful treatment by a minor operation, whilst everywhere else, I understood him to say, very extensive operations are required. I would repeat that the position of the larynx in that respect is not quite so isolated as he states, and that in malignant diseases of the ear, the lip, and the penis also very good and lasting results are obtained by comparatively slight operations.

With regard to Dr. Delavan's remarks, I would say that in quoting the experiences of my friend Mr. Butlin, to whom we all owe a great deal of gratitude, Dr. Delavan took exception to my saying that I considered a patient cured if there was no recurrence within a year, and that in his opinion we should wait three years. I can only repeat what I said in 1897, viz., that all these limitations are arbitrary, that one may fix almost any limit and yet find recurrences. I know cases in which a recurrence took place after seven years, if such an event, indeed, can justly be called a "recurrence." I do not see why the same mysterious causes which produce malignant disease the first time should not do so another time, and a very interesting corroboration of that view occurs to me in the fact that it has been observed that persons will pass from one form of cancer to another of a different structure some time after. When adopting the one year limit, I speak of practical experience. The cases on which my statistics are based go back to 1891—all being in private practice, and I have had opportunity of keeping them under observation or hearing from them through other doctors up to the present moment. As a result, I have found that unless recurrence takes place within one year it does not take place at all. There may be a legitimate difference of opinion on this point, but after such a number of years I feel justified in calling a case cured which has remained with-

out recurrence for one year, and my percentage of cures would be hardly affected if instead of the one year's limit I had adopted the three year's limit.

With regard to our operative procedure, let me say once more that I do not believe at all that our method is the only one by which good results could be obtained, but I advocate it strongly because by its adoption such excellent results actually have been obtained.

Finally, with regard to the observations of Dr. Dawbarn, which have interested me very much, I must confess that I have had no experience with the starvation treatment of these forms of cancer, but I will give this subject my fullest attention. The immediate microscopic examination which he advises in the actual course of an exploratory thyrotomy by means of the freezing microtome does not invariably yield conclusive results, as I know from personal experience. In a case of my own in which this procedure was adopted and the microscopic examination carried out by one of the greatest pathological experts of Great Britain, my friend, Mr. S. G. Shattuck, it even then remained doubtful whether the disease was cancerous or tuberculous. Under these circumstances I, of course, proceeded as if it were malignant. The patient recovered and has ever since, I am glad to say, remained in good health, but subsequent microscopic examination established the fact that the affection had not been malignant but tuberculous.

In conclusion, gentlemen, with my renewed warmest thanks for your most kind reception, permit me to urge once more that in order to obtain satisfactory results early diagnosis and thorough removal of the affected parts with a sufficient amount of healthy tissue all around the diseased area are indispensable.

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**Tonsilitis as a Prodrome to Acute Articular Rheumatism—A. C. MILLER—*Columbia Med. Journ.*, April, 1904.**

In the opinion of this author an attack of acute rheumatism is the result of the gradual accumulation, or storing up in the system of the products of the infecting bacteria, which produce a chemical reaction upon the blood and in this way we can account for the excess of lactic acid in and around the joints.

The salicylates should be given all through the attack and continued for one or two weeks after convalescence is established.

STEIN.

## THE AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

(Formerly the Western Ophthalmologic and Oto-Laryngologic Association.)

### SECTION ON OTO-LARYNGOLOGY.

*Ninth Annual Meeting, Denver, Col., August 24-25-26, 1904.*

DR. W. L. BALLINGER (Chicago), President.

DR. D. T. VAIL (Cincinnati), Secretary.

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**Report of Two Cases of Laryngeal Tuberculosis Operated on by Thyrotomy; Comments on Operation**—By OTTO J. STEIN, Chicago. (*See THE LARYNGOSCOPE, October, 1904, page 777.*)

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**The Medical Treatment of Laryngeal Tuberculosis, with Special Reference to the Use of Formalin.**—By L. B. LOCKARD, Denver. (*See THE LARYNGOSCOPE, October, 1904, page 771.*)

**Prognosis of Laryngeal Tuberculosis.**—By ROBERT LEVY, Denver. (*See THE LARYNGOSCOPE, October, 1904, page 787.*)

DISCUSSION ON THE PAPERS OF DRs. OTTO J. STEIN, L. B. LOCKARD, AND ROBERT LEVY.

Dr. H. W. LOEB (St. Louis). These papers practically comprise the whole subject, the medical and surgical treatment and prognosis, and if I do not cover the ground, I hope I will be pardoned. I am much interested in the reports of Dr. Stein; with reference to the two cases treated by thyrotomy. I may say there is no reason why it should not be performed in favorable cases, and these two cases reported it would seem were unusually favorable from the fact that only one side of the larynx was affected in each case and that prompt improvement followed, certainly in the first, and probably in the second. The crucial point in determining the result is the microscopic examination; the essayist states that the pathologist found the cases tuberculous. I, personally, in such cases, would want a very definite statement from the pathologist. I had a serious result in a similar case, which makes me chary of accepting any other than

a full statement of the pathological findings. The laryngoscopic picture was that of laryngeal tuberculosis, but after two large sections had been removed for diagnostic purposes and pronounced cancerous by the pathologist, the larynx was removed and found to be tubercular.

In the experience I have had, such favorable cases are uncommon; but where cases of that type can be had, and where the consent of the patient can be obtained for such an operation, after the various phases of the operation have been pointed out, I think it is indicated and should be performed. This conclusion is supported by the good result which Drs. Day and Jackson, of Pittsburg, had in cases of typhoid fever affections of the larynx, in which they reamed out the whole larynx with good result. There is no reason why, if necessary, the larynx should not be reamed out and the pain relieved. Dr. Stein's report will bring the subject more clearly to our attention.

With reference to the use of formalin, the report is exceedingly interesting and encouraging. It is probable that such a good report may be had in Colorado; but not in Missouri, at least, not of those cases which I have had occasion to see. No treatment has given anything like such favorable results. I do not know that the treatment given by Dr. Lockard is in use to a great extent in Missouri. He seems to think the good results can be laid to the bactericidal effect of the formalin. I do not think it will be accepted that you can render the whole larynx aseptic with formalin. You cannot reach the under surface even by scrubbing. I do not believe it necessary to kill all the germs to cure these cases. But if the germs are removed by this agent, they may light back there in a few minutes, especially as the patient is coughing up this material all the time.

Dr. WM. LINCOLN BALLINGER (Chicago). We can not attribute the after history of our cases entirely to the treatment that has been given them, as the case I will narrate well illustrates. About five years ago I had a young woman under my care who had laryngeal tuberculosis. It was almost impossible to get a view of the vocal cords. The lesion was on both sides and involving chiefly the false cords and that region. There was considerable ulceration, and complete aphonia. The patient's flesh was reduced some pounds in weight and her general health was poor. I tried to get her into a certain hospital, but did not succeed, and was going to operate by the inter-laryngeal method. She finally passed from my observation. She came to me again a few months ago, and had gained 25 pounds in weight. She still had aphonia, but her general health was excellent. I advised that she let well enough alone. This is a case

which, had I operated, would have gone on to either resolution or death, probably to death, but by some slip in the arrangements I failed to operate on her; she was in excellent health, had gained 25 pounds in weight, and may continue indefinitely in this state of health, though I presume there will be a recurrence of the acute process.

Had I operated, and had good health and increased weight followed, I would have attributed the results to the operation.

As I said, this case illustrates the fact that all results or after conditions following operations or treatments of laryngeal tuberculosis are not necessarily due to said operations or treatments.

Dr. H. B. Hitz (Milwaukee). I wish to congratulate Drs. Lockard and Levy on their results in the treatment of laryngeal tuberculosis. I think Dr. Loeb struck the keynote when he said cures are made here, that are not made in the East. In Milwaukee, we get many of these cases, but as a rule they do not do well. Once in a while much improvement occurs under routine treatment. The formalin treatment, I have never tried, but the lactic acid treatment, using as much as the concentrated solution, invariably gives improvement, if the curette has been previously applied. Ulcerative conditions heal and appear to remain so for a time, but recurrences or fresh out-breaks may be said to be the rule. Improvement, in my opinion, in most of these cases, is dependent upon the improvement in the general condition, and I believe it is the general improvement which results in this locality that accounts largely for the rapid local improvement. I do not mean to decry the benefit of local treatment, because I believe thoroughly in it, but I simply wish to remark that the results we get in the East are not nearly as good as the results the doctor gets here. I shall try the formalin treatment and watch the results with much interest.

Dr. DUDLEY S. REYNOLDS (Louisville, Ky.). I did not intend to take part in the discussion, but I wish to refer to the fact that about three years ago I had two cases of laryngeal tuberculosis coming within the same week of time. Both of these I sent to Cripple Creek—not because I had any preference for Cripple Creek over Denver, but because in suggesting Colorado, the patients suggested that locality. Both of them greatly improved in voice, in general health, accumulating considerable fat. One has returned to Kentucky and gone on a farm, and has been there about six months, and already he has begun to lose a little in flesh and look a little pale and manifest symptoms of general nervous disturbance.

The other writes that he has escaped the citizen's committee and military authorities, is doing well, and intends to stay there as long as he can.

Dr. H. V. WÜRDEMANN (Milwaukee). I wish to endorse Dr. Hitz's remark in regard to our lake climate. The person who acquires tuberculosis of the larynx in our climate is dead in a year, despite treatment, unless he goes to Colorado or San Antonio. I have sent five cases of varying degrees of laryngeal tuberculosis in patients to San Antonio for treatment, several to Denver and further south in the state of Colorado. I believe firmly that it is the outdoor, clear, ozonic air that does the work, and not our local treatment, although it is certainly necessary, even out here, to have a certain amount of cleansing and antiseptic treatment.

Dr. J. A. L. BRADFIELD (La Crosse, Wis.). I find pulmonary tuberculosis with marked laryngeal involvement nearly always fatal in our locality. Last year I saw a lady, aged 34, confined six weeks previous, failing rapidly. Marked temperature, apex of left lung being markedly involved with typical laryngeal involvement. Child weaned, and creosote administered. Temperature became normal and lung cleared tip and larynx and voice became normal. Now I do not say all such cases will die.

Dr. THOS. J. GALLAHER (Denver). The prognosis in laryngeal tuberculosis might be considered under three heads, namely, that of the lesion, voice and life. The prognosis in regard to the lesion will depend upon its area, depth and location. The more extensive the area involved and the greater the depth of ulceration the more guarded must be the prognosis. Prognosis as to voice will depend upon the extent of involvement of muscles, vocal bands and the freedom of the articulations. In regard to prognosis of life we must carefully consider the environment of the patient and amount of pulmonary disease. I have never seen a case sent here with laryngeal tuberculosis improve very much unless the pulmonary condition improved. This has been my universal experience. In regard to Dr. Würdemann's statement that climate does it all, I will say that I have never seen a spontaneous cure of laryngeal ulceration in this climate but on the other hand many cases of cure under energetic and appropriate treatment. When shall we call a given lesion cured? We must reserve the term *cure* for those lesions in which the diseased tissue is replaced with scar tissue or in which the tubercle is impregnated with lime salts. When the fibroid change occurs there is only an encapsulation and an arrest of the process but the

tubercle is not destroyed and hence arrest only is made. Arrest of the process will be indefinite but may never break down if the patient remains in suitable climate. Many simple infiltrations remain quiescent indefinitely. I do not deem it wise to curette the limited infiltrations as there is danger of opening up new channels for further infection. The curette should, however, be used freely on the ulcerations and thorough local treatment instituted.

All vegetations should also be removed before local measures are adopted. As a local application I am very partial to formaldehyd and since my first paper on the use of formaldehyd, 1898 Amer. Med. Assoc., Denver, I have been pleased still more. The treatment consists of the local application and spraying of formaldehyd followed with different powders such as orthoform and aristol, and deep intratracheal injection of oil of cinnamon, eucalyptol, etc. In addition to removing the patient to a suitable climate I deem the local laryngeal treatment imperative.

Dr. JOS. BECK (Chicago). Dr. Lockard referred to the use of the X-Ray in tubercular laryngitis, but did not mention how he used the X-Ray, whether through the mouth or through the neck—externally.

Dr. LOCKARD. One used the mouth tube and one used it externally.

Dr. BECK. Now it is a fact positively proven that the X-Rays or any other rays we have, as for instance, the Finston, or radium, to be effective are not deflected. If you try to treat laryngeal tuberculosis with X-Rays you can not get the rays down on the structure, and since the X-Rays which are given off from the negative pole against the concave surface of the tube do not reach the structure that is diseased, we can not expect results in these cases. It is well known that all the rays we are using have a great bacteriocidal power, far more than any other agents we can use without destroying the tissues, and if it were possible to use the X-Ray apparatus in the larynx you would see results. Radium has a positive bacteriocidal property, and in my paper I will tell of a case of tubercular larynx where the radium tube is applied directly to the site of the lesion. So far as the bacteriocidal effect of formaldehyd is concerned, I have carried on experiments in otitis media and have found that formaldehyd is a bactericide.

GEORGE W. SPOHN (Elkhart, Ind.). I desire to say something about the formaldehyd treatment, as I have used it with excellent results. It has been intimated that none are cured except here in

Colorado. I believe some of the cases are cured in this climate; but when the disease has not progressed very far, in the eastern states it frequently can be arrested, and the treatment given by Dr. Lockard is a splendid treatment and is far superior to nitric acid. It seems to me the prognosis depends very much upon deglutation. If we can feed our patients we can get them well. It depends upon the amount of food they can get and assimilate. I have given these patients a very weak solution of cocaine. One-half per cent, sprayed in the larynx fifteen minutes before each meal will cause it to relax, and will not hurt them. In fact, I tell them to swallow the cocaine. When there is relaxation of the pharyngeal muscles, the patients can eat a good meal and enjoy it. I have never seen a case that acquired the cocaine habit from this use of it.

On the other hand, by improving their nutrition by forced feeding, and using the formalin sprays, the patient will show improvement in ten days or two weeks unless the disease has progressed to the point where there is no relief.

Dr. OTTO J. STEIN (closing). In reply to Dr. Loeb's remark regarding the pathological findings, I will say that I have one detailed report showing the round cells and tubercular bacilli, which was conclusive in my mind and the minds of those who saw the specimens. The other case was reported by the pathologist simply as tubercular tissue, without any further details.

I would like to add a remark as to the medical treatment of this disease with formalin. I have used it in a few cases recently with what, apparently, are astonishing results. I was more than pleased with the relief afforded, and I have every hope in the world that possibly we have in this remedy one that will prove of greater value than we really realize now.

Dr. L. B. LOCKARD (closing). I think no one will deny that the climate does play an important role, but it is certainly not the chief element in the cure of laryngeal lesions. Without treatment the disease will develop and progress as it does elsewhere, while the institution of local treatment will usually cause prompt improvement. That retrogression almost invariably follows a too early discontinuance of treatment, is sufficient proof that the effect of the climate if only an indirect one, and that it does not play the important part that has been credited it in the discussion. I have not intended to say that formalin is a specific or cure-all; it is simply better than anything else, and I do not claim its chief action is a germicidal one. If it had no antiseptic action whatever, I think it would still be the best remedy we have. There is no question that if there is an ulcer-

tion, the germicidal action, no matter how slight, does good. Of course a perfect laryngeal germicide is out of the question. In regard to the X-Ray I think we get too much instead of insufficient reaction. Three of my cases which were favorable, developed dysphagia after a few weeks and we could not pursue it. I never saw the slightest result in a curative way, but probably all showed aggravation of the inflammatory conditions. I have been asked the strength of the formalin. As used in the spray at home it is from one to three drops to the ounce, and applications of three to ten per cent.

Dr. ROBERT LEVY (closing). I have attempted, in speaking of prognosis, on other occasions as well as this, to establish a middle ground. I think we must be very careful not to become too enthusiastic either as to its hopelessness or hopefulness. If we can study these cases as we do others, arriving at a fair conclusion, I think we can accomplish all that can be expected. I would warn against too much optimism, but at the same time, I believe we must fight the general feeling that exists among a great many general practitioners and the impression that has gone out up to the present time that these cases are hopeless. I want to establish a middle, fair, rational position.

**Some Experiments with Adrenalin Chloride.**—By D. E. WELSH,  
Grand Rapids, Mich.

See THE LARYNGOSCOPE, December, 1904, Page 950

#### DISCUSSION.

Dr. S. H. LARGE (Cleveland, O.). I would like to call attention to the experiments of Dr. Crile, of Cleveland, who has made an exhaustive study of the action of adrenalin chloride. He proved that the solution injected intravenously was fatal in large doses. They are using it now in surgical shock. You can inject the solution subcutaneously it must be watched very carefully and the dose etiologically cutaneously without serious results, but when used intravenously it must be watched very carefully and the dose must be comparatively small.

Dr. JOS. C. BECK. I am much interested in this paper, because I have had some experience with adrenalin in operating on the mastoid. Permit me to report briefly the case, one of marked necrosis of the mastoid in a colored man 23 years old, with a complication of facial paralysis. A diagnosis had been made that tuberculosis existed in the lungs, and I accepted the diagnosis that this was a tuber-

cular condition. The usual procedures before operation were taken and the heart, etc., found normal. No uneasiness was felt in regard to giving the patient chloroform, previously using gas. I had just gotten into a very rotten mastoid, when the doctor said the pulse was at least 200. Knowing Dr. Crile's demonstration of using adrenalin and pressure on the body to overcome shock and such conditions, I gave orders to inject adrenalin subcutaneously, and the pulse went down to 120, and remained down sufficiently for me to finish the operation. I had occasion to use it again in a similar but not so alarming condition as that, and I am satisfied with the report of Crile, particularly when associated with anaesthesia.

Dr. A. H. ANDREWS (Chicago). We will frequently have cases of general anaesthesia going wrong. We find them in cases similar to those reported by Dr. Welsh, in which no adrenalin chloride had been used, and it is possible for a series of cases to occur together. It strikes me as possible that Dr. Welsh's cases are purely due to the anaesthetic and that the adrenalin had nothing to do with the symptoms. I would like to know whether any of the members present have had such experience after using adrenalin, either by local application or by injection, when a general anaesthetic had not been given.

Dr. A. C. FRIEDMANN (Colorado Springs, Colo.). I call attention to a case reported of the use of adrenalin at the same time as atropin. It was in the "German Weekly for Therapy and Hygiene of the Eye" and the patient experienced an attack of atropia poisoning with all its symptoms while when formerly (without adrenalin) under a mydriatic never anything of the kind happened. The writer accused the adrenalin of facilitating the passing of the atropia through the lacrymal duct and into nose and throat. In a reply I advised to use always atropia first and after a short interval the adrenalin. I have always done so and never observed any ill effects of either drug.

Dr. H. L. BURRELL (Omaha, Neb.). I had a little experience with adrenalin chloride which it might be well to relate at this time. Having occasion to operate on a deflected septum, I packed the nose with a 1-5000 solution in cotton and then used cocaine for anaesthesia. After finishing the operation, which was beautifully bloodless, the patient complained of feeling very weak. I laid him on the table and found his pulse to be only thirty-eight. It was nearly two hours before it reached sixty beats per minute. I have given ten drop doses three times a day of a 1-1000 solution for tinnitus aurium without systemic symptoms.

Dr. W. T. GROVE (Eureka, Kan.). I used a drachm of adrenalin chloride in two children, aged 4 and 6 years respectively, for double tonsillotomy and did not have any bad effects whatever. I used it locally with a swab. The patients were under observation two hours after operation with apparently no hemorrhage. I used the cold snare on one side and tonsillotome on the other.

Dr. DUDLEY S. REYNOLDS. I have had considerable experience with this in nasal surgery and in operations on the tonsils and in mastoid operations. I take a cotton mop and mop it freely on the pharynx, and push it into the cripts of the tonsil and behind the uvula, and spray it into the nose before an operation of any sort. I put it in the spaces between the turbinal bone and use it freely every day, and the patients swallow it even, and I have yet to see any bad effect and I think it is a fallacy to suppose that it predisposes any one to hemorrhage. I think there is less tendency to hemorrhage than where it is not used, and I am sure there is no increase of a predisposition to toxicity to be reasonably feared from its use.

Dr. A. ALT. I want to say that not all hemorrhages are arrested by adrenalin. I happen to know of a case of fatal hemorrhage from the conjunctiva in a new born child after the application of nitrate of silver to prevent infection, in which the adrenalin, even when powdered on the oozing surface, failed utterly in stopping the hemorrhage. In fact, in my experience adrenalin is a good remedy in order to prevent the local hemorrhage which would follow an operation, but not a good haemostatic after bleeding has been established.

Dr. D. T. VAIL. In the case Dr. Alt has reported, I agree with him that the explanation of the inefficacy of adrenalin lies in the fact that its application to a mucous membrane which is leaking is useless. I have attempted to stop nasal bleeding by putting it into the nose, and it is inert. The only time you can rely on it is before the abrasion is made.

Dr. MORRILL. I have had a little experience with adrenalin chloride. I had occasion to operate on a deflected septum, and had cotton saturated with 1-5000 and used cocaine also for an anæsthetic, and went on with my operation, and it was beautifully bloodless, and just about the time I got through with the operation the patient complained of being very faint, and I laid him down on the table. His pulse was 38. I watched him for an hour; and it was fully two hours I think before his heart reached 60 beats per minute. I have

given it internally, ten drops three times a day for tinnitus aurium without systemic symptoms whatever.

Dr. J. C. BUCKWALTER (St. Louis). I use adrenalin always in operating in the nose, on the eye or lids, injecting in the lids frequently ten drops, and I have never seen any untoward effects. For nasal operations I prescribe 2 drachms of adrenalin and direct the patient to take from 5 to 10 drops every hour or two, according to the age and according to the amount of hemorrhage, if they have hemorrhage when they go home, or before they go home. Frequently patients have taken a drachm in the course of 12 to 16 hours without any bad effects whatever.

**Experiments with Radium in Some Nose, Throat and Ear Diseases.**—By DR. JOSEPH C. BECK, Chicago, Ill.

*See THE LARYNGOSCOPE, December, 1904, Page 897.*

DISCUSSION.

Dr. DERRICK T. VAIL (Cincinnati, O.). This valuable contribution should not be passed over without some discussion, in order that the subject may be elucidated as much as possible. I have had no experience with radium and would ask Dr. Beck whether he finds that in his experience radium is as efficacious a therapeutic remedy as is the X-Ray with the various mechanisms we now have for applying it to the nose and throat.

Dr. GEO. W. SPOHN (Elkhart, Ind.). I have had considerable experience with the X-Ray, but none with radium. When it comes to the treatment with the X-Ray beyond the surface, I do not believe it is of much use. It is possibly of benefit in the ear, and in the nose where you can use a speculum and throw the ray on the lesion. Frequently one can cure a suppuration in four or five applications. But if it has to traverse healthy tissue, I have never had any results whatever in the mouth, nose or ear. In a case of otorrhoea in the external canal, and in the region of the drum, with a speculum, and without touching the other tissues, I have had good results. In case of mastoid troubles, with intense pain or suppuration, the high frequency current has been of service. Perhaps these cases would have gotten well anyhow, but the very painful symptoms of mastoiditis were overcome.

(TO BE CONTINUED.)

